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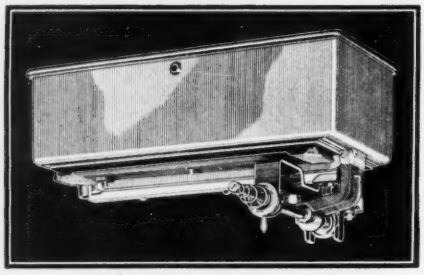

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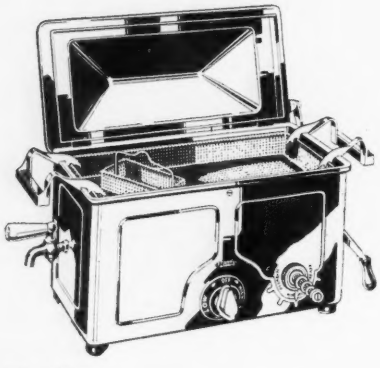

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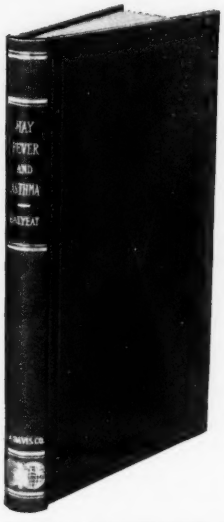

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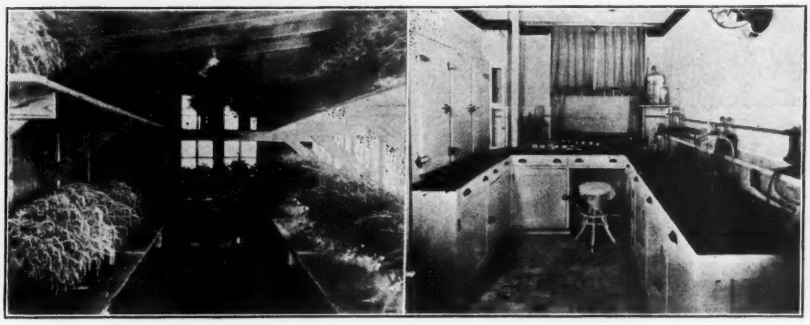

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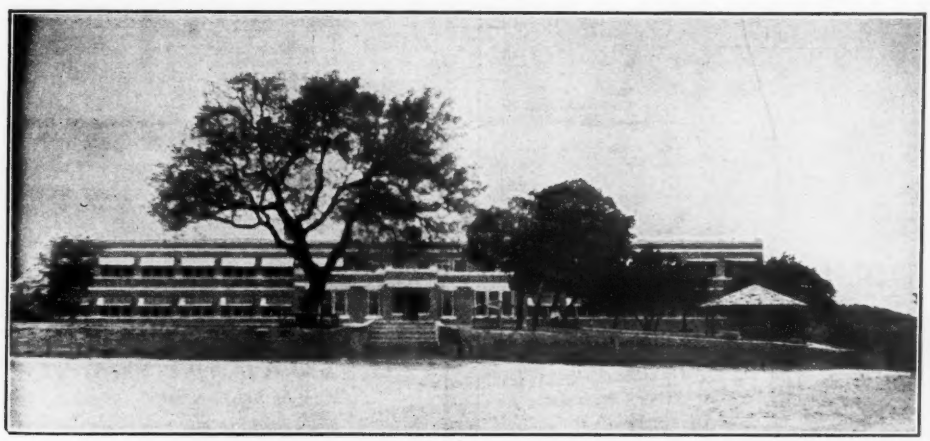

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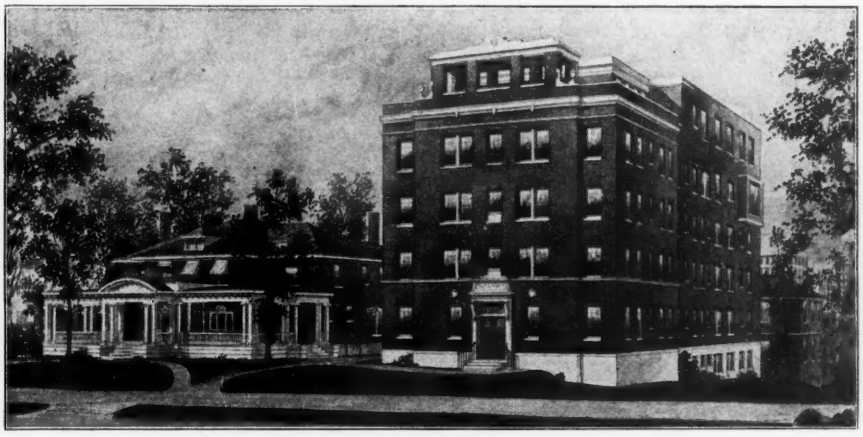

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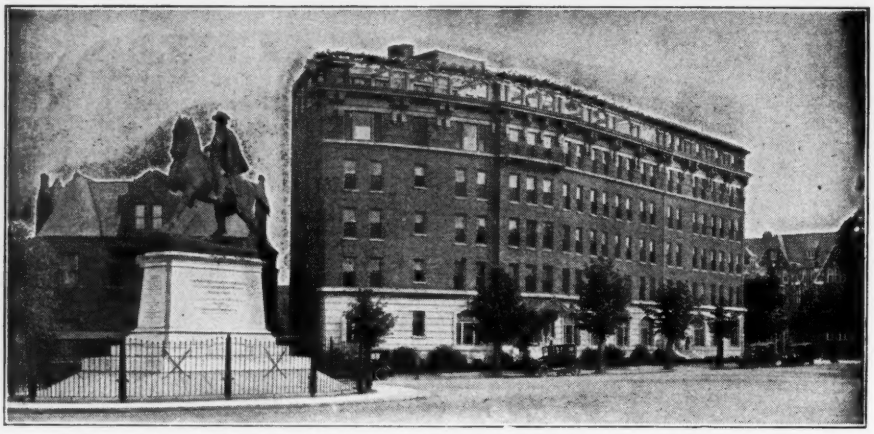

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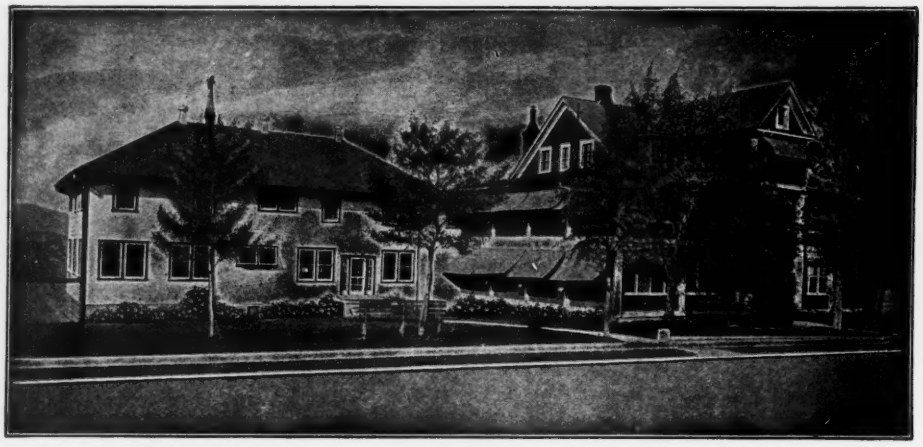

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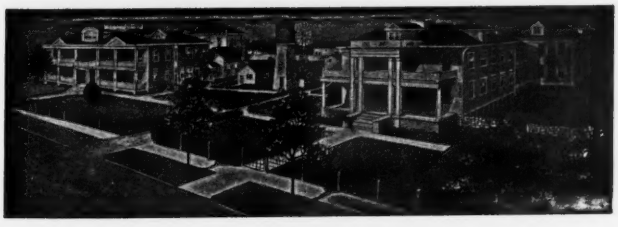

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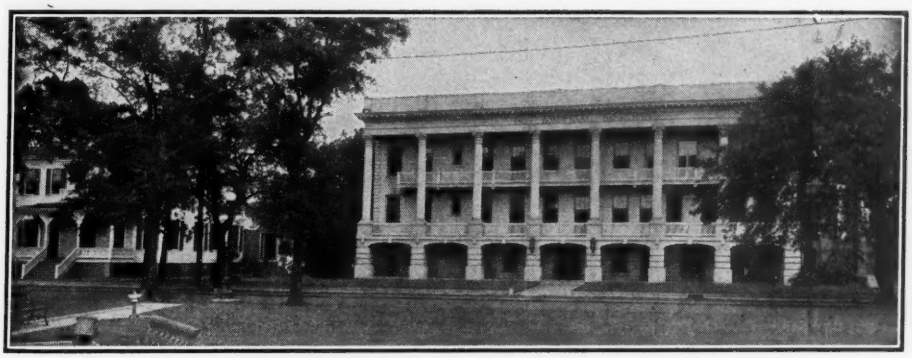

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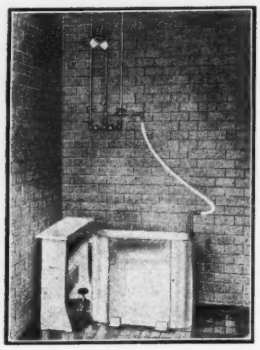

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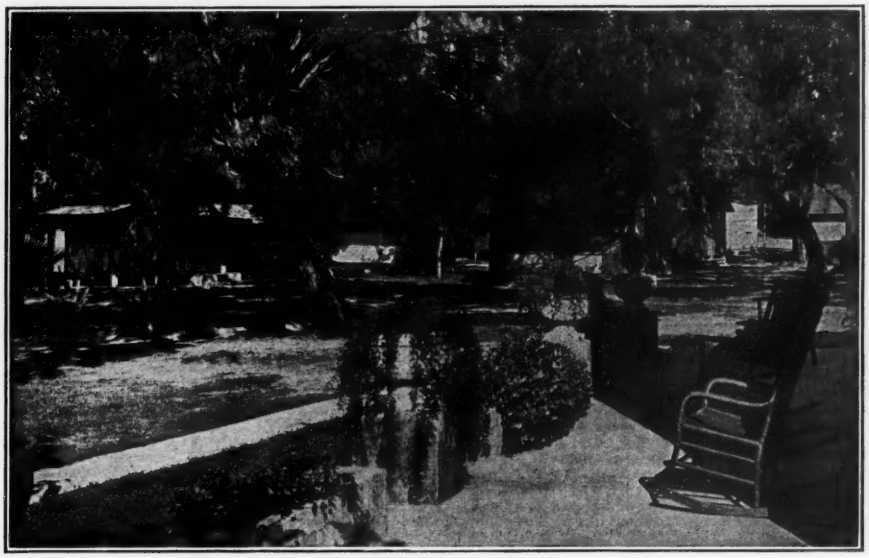

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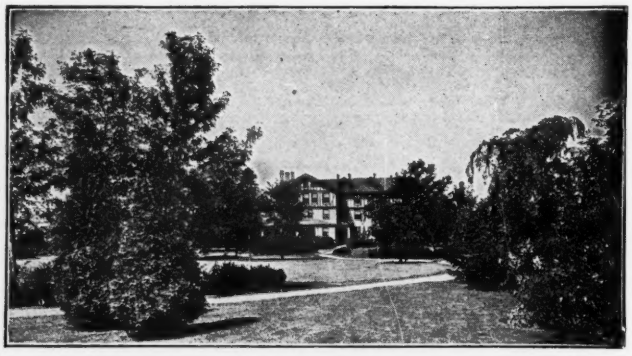

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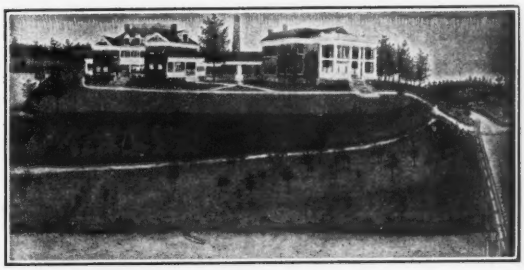

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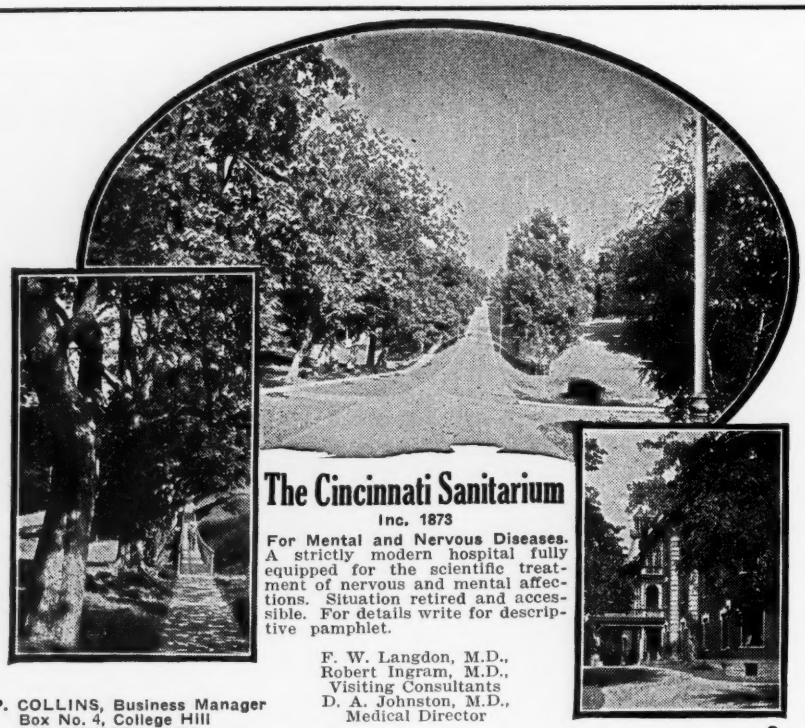

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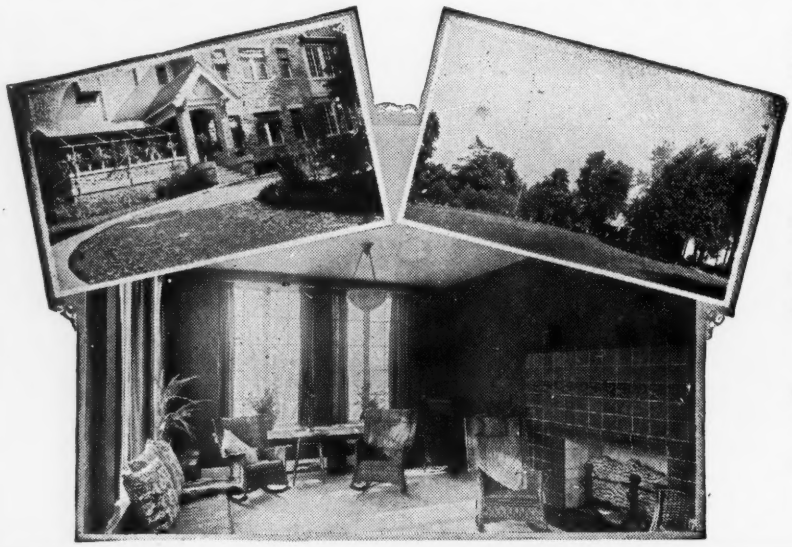

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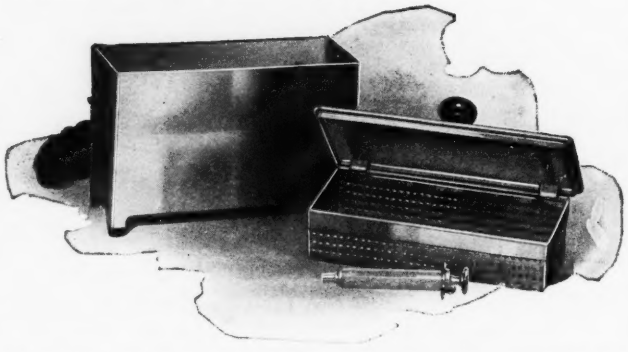

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Volume XXI JUNE 1928 Number 6

RECENT PROGRESS IN THE TREATMENT OF PULMONARY TUBERCULOSIS*

By LEWIS J. MOORMAN, M.D.,
Oklahoma City, Okla.

Since it would be impossible for me to call attention to all of the recent therapeutic measures employed in the treatment of tuberculosis, I propose to limit my remarks to a discussion of the collapse therapy of advanced pulmonary tuberculosis; in other words, artificial pneumothorax and extrapleural thoracoplasty.

We are all familiar with the splendid results which have been obtained by the routine rest, dietetic and hygienic measures in the treatment of tuberculosis, especially in those cases diagnosed fairly early. An appraisal of the relative merits of these three measures places emphasis upon rest. By bed rest we not only conserve energy and increase resistance, but we get a certain degree of lung rest; the respiration is slowed and its depth diminished. It has been observed that Nature attempts to bring about local rest through fixation of the muscles which influence respiration, especially the muscles in the neck and abdomen, thereby decreasing the diaphragmatic movements and to some extent splinting the lung through limitation of motion of the thorax. Furthermore, it has been observed that pleurisy with effusion, of tuberculous origin, has often brought about marked improvement in the lung which is partially collapsed by the presence of fluid. It has also been noted that spontaneous pneumothorax in cases of advanced tuberculosis often brings about prompt improvement in the collapsed lung. Puncture wounds of the chest admitting air from without have been found to encourage healing of the tuberculous process, so we have gotten our cue from Nature. We have learned that collapse of the tuberculous lung slows the progress of disease and favors healing.

This leads us to the consideration of artificial pneumothorax or induced collapse of the lung by means of the introduction of air through a needle into the pleural sac. I shall not take the time to mention the indications and contraindications or to give the technic of this procedure.

Sometimes it is impossible to find the pleural space because of adhesions of tuberculous origin. Often when we do find the space, it is so limited by adhesions that artificial pneumothorax may not prove successful. Consequently in the last few years, realizing that in such cases the indications for collapse still exist, we have found a means of bringing this about through surgical intervention or extrapleural para-vertebral thoracoplasty. I have some lantern slides showing the results of treatment in advanced cases which were considered otherwise hopeless. I believe those of you who are in general practice and have not been specially interested in this subject will be convinced that there is something to offer your cases of advanced tuberculosis.

I am indebted to Dr. Horace Reed, of Oklahoma City, for most skillful, intelligent and sympathetic cooperation in the cases of thoracoplasty, and I wish to impress upon you the fact that such cooperation between the phthisiotherapist and the surgeon is very necessary. In fact, thoracoplasty is simply an incident in the course of observation and treatment. The success of the operation depends very largely upon the subsequent management of the case.

Fig. 1.—This first slide shows a collapse of the right lung in a patient who came into the Farm Sanatorium in 1925 with advanced bilateral disease. He was very toxic and daily expectorated 4 to 6 ounces of tubercle bacilli laden sputum. We collapsed the right lung on account of advanced disease with cavity formation. This was done in spite of the fact that the left lung

*Clinic, Clinic Session, Southern Medical Association, Twenty-First Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

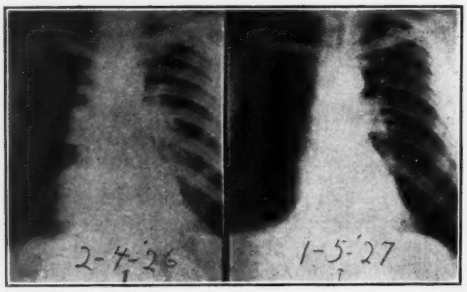

Fig. 1

showed a good deal of infiltration. Improvement was prompt and progressive, but fifteen months after pneumothorax was induced the sputum was still positive. If you inspect the collapsed lung in the fifth interspace you will note a small cavity still persisting. By gradually increasing the pressure at each filling we were able to obliterate the cavity. The tubercle bacilli disappeared from the sputum and the left lung cleared. The wife and two children were relieved of the danger of infection. The patient is now in charge of the Sanatorium Farm with practically full earning capacity.

Fig. 2.—This patient came into the Sanatorium in 1921 with advanced bilateral pulmonary tuberculosis, with a diagnosis of pulmonary abscess at the base of the left lung. He had all the manifestations of a non-tuberculous pulmonary abscess with quantities of foul-smelling sputum. We were quite sure after studying the case that he had tuberculosis and we found the sputum loaded with tubercle bacilli. After several months of downhill progress we advised collapse of the left lung in spite of the fact that he had moderately advanced trouble in the right. In addition to the infiltration evident in both lungs, you see a large

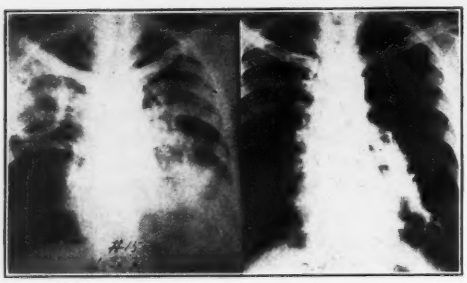

Fig. 2

annular shadow on the right. The second film was made nearly six years after the initial filling. He continues with the fillings every six weeks. The upper lobe of the left lung is partially collapsed, with no evidence of disease. The lower lobe shows marked calcification. The right upper lobe has cleared with some calcification and the annular shadow has disappeared. This man has a wife and three children. He has been free of tubercle bacilli for five years and has been working full time for four years.

Fig. 3.—This patient came into the Sanatorium having had his initial filling in another city. He came to me still carrying a large cavity in the upper lobe of the left lung. As you may see in the first film, he had some adhesions which were limiting the collapse of the cavity. His right lung is fairly clear. The second film was taken several months later, after we

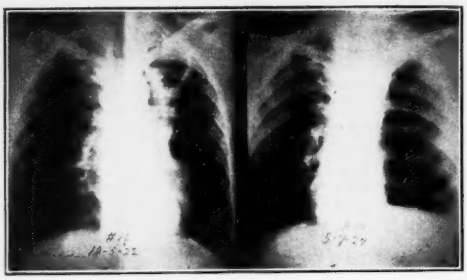

Fig. 3

had employed more frequent fillings with increased pressure. In this case we also had to deal with a tuberculous empyema and a tuberculous abscess in the chest wall with a communicating sinus. These pathological conditions completely cleared under treatment. This man has negative sputum and has been working for three years supporting his family.

Fig. 4.—This is a similar case showing the pathological condition before collapse was instituted. You see a large cavity in the upper lobe of the right lung with a fluid level. I first thought this was a case of pulmonary abscess. The woman was acutely ill with

Fig. 4

symptoms and signs suggesting abscess. We found tubercle bacilli in the sputum and in two weeks' time we decided to collapse the right lung. In the second film, taken six months later, you see the result of the collapse. The woman is at home with her family, taking care of her household duties, absolutely free from symptoms and from tubercle bacilli.

Fig. 5.—This is the case of a young woman who came to me two years after having artificial pneumothorax on the right side with rather advanced trouble in the upper left lung. She worked part time, but had influenza and developed active progressive trouble with cavity formation in the left lung. I advised letting the

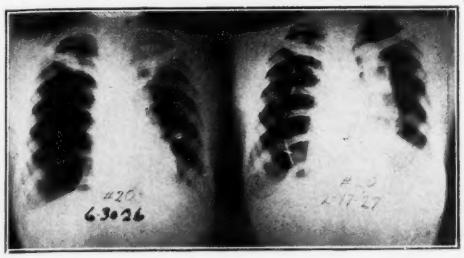

Fig. 5

right lung come out to some extent and collapsing the left. Here you see the left lung partially collapsed with the cavity still showing in the upper lobe. She is improved to such an extent that she is making a living by part-time work. This is a beautiful example of bilateral collapse.

Fig. 6.—This is another case of bilateral pneumothorax. I am sorry not to have a picture to show the condition of the lungs before the collapse was begun. This young woman was working and helping support invalid parents. She came to the Cottage Sanatorium because of profuse pulmonary hemorrhage. She insisted that she could not stay in the Sanatorium because she had to work. We collapsed the right lung to stop the hemorrhage and kept her two weeks. She went back to work

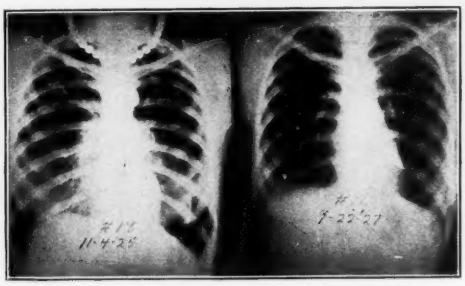

Fig. 6

and carried the right lung collapsed. Through overwork the contra-lateral lung became acutely involved, and again she developed profuse hemorrhage which seriously threatened her life. We decided to collapse the left lung in an attempt to check the hemorrhage. In the first film you see both lungs partially collapsed, the picture having been made some time after collapse was instituted and after marked clinical improvement. A year later she was so well that she gave up the collapse on both sides. The second film was taken nearly one year after pneumothorax was discontinued. She is working full time.

Figs. 7 and 8.—These represent a case which came into the Farm Sanatorium with bilateral pulmonary tuberculosis and a tendency to fibrosis in the upper right with a progressive and destructive process in the upper left. After she had remained in the Sanatorium two years in a practically stationary condition, with perhaps some improvement in the right and some advance in the left, we decided to employ artificial pneumothorax on the left. We were unable to find the space after several attempts, and consequently, in spite of the trouble in the upper right, we advised phrenicotomy, hoping to slow down the active process in the left lung through a paralysis of the diaphragm. The operation was performed and we had a diaphragmatic rise of about one inch with some improvement in the girl's condition, but not sufficient to encourage us

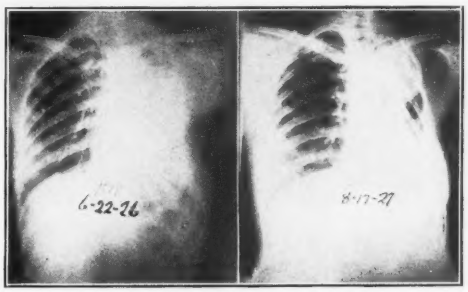

Fig. 7

Fig. 8

greatly. About four months later we advised thoracoplasty and, under local anesthesia, the first to the seventh ribs, inclusive, were removed. In this case we reversed our usual procedure because of the phrenicotomy and because the pathological condition was in the upper part of the lung, removing the upper ribs first. This young woman several months later showed a clearing even in the collapsed side and a good deal of clearing in the contra-lateral lung, as may be seen in *Fig. 7*. The sputum was reduced from four ounces in twenty-four hours to one dram, and has been free from tubercle bacilli for over a year. She makes her way in the Sanatorium by doing clerical work.

Fig. 9.—This is a picture of a woman now 57 years old who came into the Sanatorium in January, 1926, with moderately advanced trouble in both lungs. The disease seemed to be more active in the right with a cavity in the upper right lobe. We kept her in the Sanatorium for a year without much improvement. There was possibly some improvement in the left.

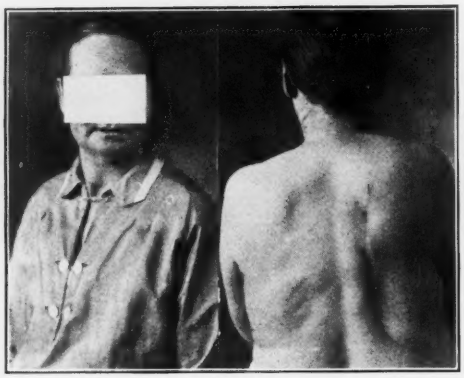

Fig. 9

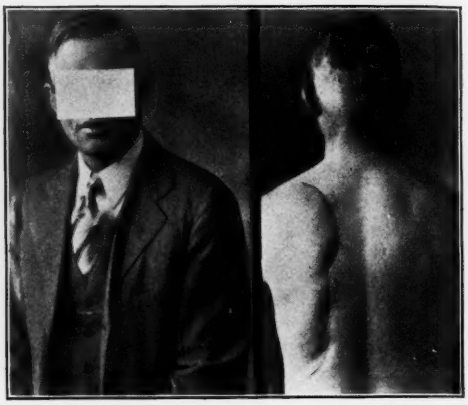

Fig. 10

After we had made several unsuccessful attempts to collapse the right lung by means of artificial pneumothorax she begged to have a surgical collapse because she was on the same porch with the young woman whose case we have just discussed. Finally, after a thorough explanation of the danger and significance of the operation, and in view of the fact that she was not improving, we decided to collapse the right lung by surgical means. The seven lower ribs on the right side, the fourth to the eleventh, were removed. This resulted in partial collapse of the right lung and marked clearing of the left, as shown by subsequent x-rays. She is now free of tubercle bacilli and has returned to her family.

May I call attention to the fact that collapse on the right side is fraught with a good deal more danger than on the left because of the heart? On the right side the heart has thin walls and along with the lung may suffer collapse and consequent embarrassment.

Fig. 10.—This young man stayed in the Sanatorium for one year because of advanced tuberculosis with cavity formation in the left lung. At the end of a year, failing in artificial pneumothorax because of adhesions, I advised him to consider thoracoplasty. Eight ribs were removed at the first operation. About six weeks later the three remaining upper ribs were removed and his sputum, which had measured four ounces daily, practically disappeared and became free of tubercle bacilli. He worked for six months, developed appendicitis and was operated upon eighteen hours after the onset. He had a gangrenous appendix requiring drainage. The operation caused a flare in the left lung with a return of tubercle bacilli in the sputum, which were present for about six weeks. He is again free of tubercle bacilli with restored earning capacity.

Fig. 11.—This young lady had advanced pulmonary tuberculosis and was sent to the Cottage Sanatorium in 1917 because of repeated hemorrhages. She had advanced tuberculosis in the left lung with cavity formation. Artificial pneumothorax was induced with good results. She left the Sanatorium greatly improved, but had influenza and pneumonia in 1919 and developed empyema. She was critically ill for weeks and then seemed to get well. She practically forgot the fact that

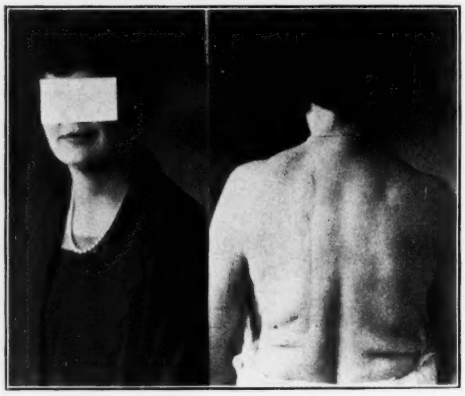

Fig. 11

she had had an artificial pneumothorax. In 1926 she had influenza and called me because she thought she was having a profuse hemorrhage. I found she was expectorating quantities of sanguinous purulent material and was astonished to find that the old empyema had been carried all these years and had broken through a bronchus. She expectorated a pint of this material daily for a year. We advised thoracoplasty. She had eleven ribs removed with two operations and now expectorates about two ounces a day. With the exception of a return of an old fistulous condition about the rectum she is apparently well.

Fig. 12.—This woman, after having been in bed six years with repeated hemorrhages, had a thoracoplasty six years ago. Eleven ribs were removed at one time. She had a rather stormy convalescence. She has been at work for four years, not only taking care of her house work, but at times doing five hours a day stenographic work.

Fig. 12

May I again urge you to remember the fact that you have something to offer your cases of advanced pulmonary tuberculosis? These people with collapse from artificial pneumothorax and thoracoplasty are going about their affairs all over the world, attending to their own business, seeking no favors and making no complaints. About 35 per cent will return to work and an additional 40 per cent will be improved, provided the cases are well chosen, well managed and surgery is determined upon after a very careful, discriminating study of each case.

DIFFERENTIAL DIAGNOSIS OF RENAL TUMORS*†

By WILLIAM F. BRAASCH, M.D.,
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Owing largely to the development of the interpretation of pyelographic and cystoscopic data, renal tumor can usually be diagnosed clinically without great difficulty. The characteristic deformities of the renal pelvis caused by tumor have become so definitely established that detailed description of them is hardly necessary. The lesions which affect the outline of the pelvis of the kidney are neoplasm, hydronephrosis and cysts. The problem for discussion in this paper is the clinical identification of the different types of tumor, which is frequently made possible by means of urography, supplemented by clinical and cystoscopic data.

It is advisable, both anatomically and clinically, to divide renal neoplasms into two groups: those originating in the renal cortex and those originating in the renal pelvis. The most common cortical tumors are hypernephroma (papillary adenocarcinoma), carcinoma (alveolar carcinoma), sarcoma, papillary cystadenoma, adenoma and lipoma. Among the tumors originating in the renal pelvis are epithelioma, papilloma and leukoplakia. Such tumors may present recognizable clinical and pyelographic data which facilitate clinical differentiation.

The tumor of cortical origin most frequently observed is so-called hypernephroma, or papillary adenocarcinoma. Hypernephromas usually grow slowly and in the early stages cause few if any clinical symptoms. Hematuria does not usually appear until in the later stages, and usually when the tumor is easily palpable. Alveolar

Fig. 1
Typical deformity of hypernephroma showing elongation and hooking of the calices.

*Read in Section on Urology, Southern Medical Association, Twenty-First Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

†From the Section on Urology, Mayo Clinic.

Fig. 2
Deformity with hypernephroma showing abbreviation and narrowing of calices in upper pole, with elongation in lower.

carcinoma, on the other hand, may grow much more rapidly and the symptoms of hematuria or pain are seldom of more than one or two years' duration unless the growth is secondary to renal lithiasis. The carcinoma soon involves the pelvis, with a tendency to extend beyond the capsule of the kidney. Pain in cases of cortical tumor is usually caused by involvement of the surrounding tissues, and when present adds to the gravity of the prognosis.

The clinical picture of tumor originating in the renal pelvis is quite different. Since the tumor develops in the lumen of the pelvis the pain, if present, is usually caused by urinary obstruction. As the tumor grows, it may occlude the pelvic lumen to a greater or less extent and cause intermittent and variable hydronephrosis. The tumor is generally not palpable until such secondary hydronephrosis has developed. Hematuria is common and occurs early. In every case of hematonephrosis the possibility of tumor of pelvic origin must first be excluded.

In short, the clinical differentiation of cortical and pelvic tumor rests largely on the following data: in cases of cortical tumors a definite firm and irregular mass in the renal area may usually be made out on abdominal palpation. The pelvic tumor is less often palpable, but when present is cystic and soft, and is caused by hydronephrosis. Hematuria in cases of cortical tumor does not occur until the later stages. In pelvic tumors the hematuria usually occurs in the early stages. The pain accompanying cortical tumor is caused by extension into the surrounding tissues, and calls for a guarded prognosis; the pain accompanying pelvic tumor is caused by secondary obstruction resulting from hydronephrosis and has no bearing on prognosis.

The pelvic deformity outlined in the pyelogram in cases of hypernephroma or adenocarcinoma is usually characterized by elongation of the calices. The major calices may be con-

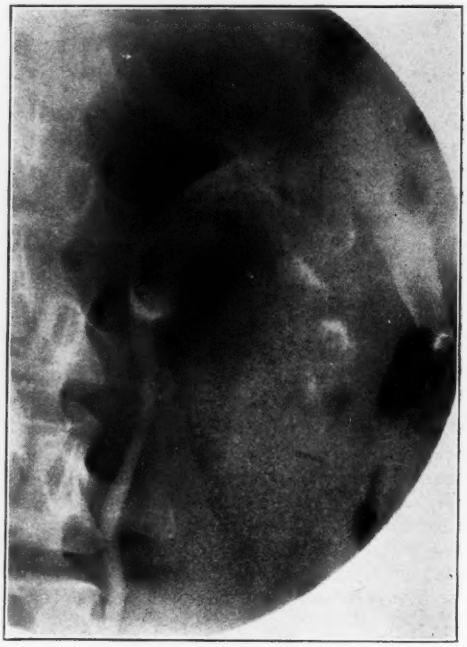

Fig. 3
Typical deformity with alveolar carcinoma, showing filling defect.

stricted and flattened throughout and the minor calices may be tapering, often with a hook-like termination. Usually only one or two of the major calices are involved; the deformity is variable in the adjacent portion of the pelvis. In cases of alveolar carcinoma the growth involves the pelvic wall to a greater extent and

Fig. 4
Median displacement of pelvis and ureter with deformity of lower calyx, showing intrarenal nature of tumor.

instead of elongation and narrowing of the calices, there is likely to be abbreviation and irregular dilatation. The pelvis may be dilated or largely obliterated by extension of the growth into its lumen. A firm, irregular tumor of rapid growth with distinct irregularity of the pelvic lumen and abbreviation and necrosis of the calices, rather than elongation, would be strongly suggestive of alveolar carcinoma. If, also, there is rapid loss of weight and particularly if there is a long-standing history of renal lithiasis, the diagnosis can usually be made.

It may be difficult to make a differential diagnosis of hypernephroma and polycystic kidney from the pyelogram. Although elongation of the calices may be similar in degree, in cases of neoplasm there is a tendency to narrowing and tapering of their ends which is not usually seen in polycystic disease, in which the calices are usually broader throughout and all of them are involved. In case of doubt a pyelogram of the other kidney should be made, since in polycystic diseases there is always pelvic deformity in both kidneys. Finally, the general clinical data associated with polycystic kidney are usually those of nephrosis, and include to a variable degree evidence of diminished renal function, increase in blood pressure, and so forth.

The value of the minor changes in the outline of the renal pelvis in the diagnosis of tumor has been more fully appreciated during the last few years, particularly unusual deformity of the pelvis or of a calix appearing in repeated pyelograms. To illustrate: an abnormal elongation of one of the calices might well indicate early

Fig. 5
Lateral displacement with extrarenal tumor.

neoplasm. With constant repetition of such minor deformities in the pyelogram accompanied by either gross or microscopic hematuria, or possibly by impaired function of one kidney, the possibility of neoplasm must be considered.

Fig. 6
Deformity in lower calyx accompanying adenoma.

Needless to say, it is necessary to fill the pelvis completely in order that the interpretation may be of any value.

Benign tumors of the kidney, including lipoma, adenoma and cystadenoma, do not present recognizable characteristics in the pyelogram, although the resulting deformity is usually different from that accompanying malignant neoplasm. Elongation of the calices and other common deformities of hypernephroma are, as a rule, not observed. The pyelogram may resemble that of compression by an extrarenal tumor or such as occurs with alveolar carcinoma, and is then characterized by constriction or flattening of the true pelvis and abbreviation of the calices.

The differential diagnosis of renal neoplasm and the common type of hydronephrosis can usually be made by the characteristic outline of the pelvis occurring with pyelectasis. Difficulties in differentiation may arise when there is a degree of obstruction of the ureteropelvic juncture to prevent the medium from entering the renal pelvis in sufficient quantity to outline it, and also when the pyelectasis occurs secondary to tumor of the pelvis. Failure to outline the pelvis in the presence of neoplasm may be due to invasion of the pelvis or adjacent ureter by the tumor. When this takes place there will usually be sufficient lumen remaining to permit some of the opaque medium to enter. As a result, the pyelogram may show only several streaks or crevices to represent the pelvis, and there may be irregularity in the outline of the

Fig. 7
Filling defect and obliteration of upper calyx by papillary epithelioma of renal pelvis.

ureteropelvic juncture. In cases of simple hydronephrosis in which there is partial occlusion little or no medium may enter the pelvis. The small amount that does enter will usually be so diluted by the retained fluid that only a dim diffuse shadow results, or there may be no definite evidence of the opaque medium. Since similar occlusion at the ureteropelvic juncture may also occur in cases of renal tuberculosis and renal aplasia, the interpretation of such deformity may be exceedingly difficult. The differential diagnosis of hydronephrosis secondary to pelvic tumor and primary hydronephrosis may also be difficult. In many cases of papillary tumor of the pelvis there will be either a filling

Fig. 8
Partial obliteration of pelvis and dilatation of calices with papillary epithelioma of renal pelvis.

defect or irregularity in the outline of the true pelvis caused by the pelvic tumor, which will call attention to the etiologic factor.

Large solitary cysts in the renal cortex may be so situated as to compress the pelvis or calices, causing a deformity which is shown in the pyelogram, and the condition may be easily confused with that of neoplasm or deformity from pressure of an extrarenal tumor. The deformity accompanying large cysts usually consists of: (1) abbreviation of the adjacent calices; (2) compression and flattening of the adjacent portion of the renal pelvis; and (3) change in position and axis of the kidney as the result of the tumor in one pole.

The outline of the tumor in the original roentgenogram may be of some value in the differential diagnosis. Care must be taken, however, in the interpretation of the outline of a soft shadow and too much reliance cannot be placed on it. If the outline of the tumor is continuous with that of one pole of the kidney, its cortical nature may be inferred. Only recently I had occasion to observe a roentgenogram in which to all appearances there was a definite outline of a

Fig. 9
Flattening of lower calices and of pelvis by large simple renal cyst.

Fig. 10
Typical elongation and widening of calices with polycystic kidney.

normal kidney. Unfortunately for the interpretation, however, the kidney had been removed several years before and it was apparent that the liver and other adjacent tissues had assumed a position that caused the apparent renal outline. The outline of the tumor in relation to the pyelogram may often be significant in the differential diagnosis of extrarenal tumor. The outline of a simple cyst may be visible adjacent to that of the renal pelvis and its relation to the pelvic deformity may be of value in its identification. The irregular outline of bilateral polycystic kidneys is occasionally recognizable.

It may be difficult to distinguish deformity caused by a tumor of the renal pelvis from that resulting from cicatricial changes secondary to chronic pyelonephritis, particularly in the presence of hematuria. Granuloma and areas of erosion as a result of chronic cicatricial pyelonephritis may cause marked irregularity and areas simulating filling defects in the outline of the pelvis and of the adjacent ureter. Similar deformity will usually occur in the urogram of both sides, since chronic renal infection is usually bilateral. The accompanying deformity in the outline of the ureter will, also, differentiate the two conditions, since with chronic infection similar cicatricial deformities will involve most of the ureter. The importance of the ureterogram in cases of papillary tumors of the renal pelvis must also be recognized. Filling defects in the outline of the ureter corresponding to metastatic processes, with areas of dilatation between, may be outlined. As a result of metastatic obstruction in the lower end of the ureter, ureterectasis may follow. In many cases, however, the extent of metastasis will be so slight that no recognizable deformity will be visible in the ureter. Leukoplakia of the renal pelvis may also cause considerable cicatricial deformity of the pelvic outline, and it may easily be confused with that occurring with chronic cicatricial pyelonephritis, so that its recognition may be difficult.

The differential diagnosis of intrarenal and extrarenal tumors is occasionally difficult. As a rule, the outline of a normal pelvis situated at some distance from the outline of the tumor in question will determine its extrarenal nature. Abnormal displacement of the renal pelvis may not be of much diagnostic value, since it may be the result of either extrarenal or intrarenal neoplasm. Although the displacement is usually greater in cases of extrarenal tumor, it may be

Fig. 11
Obliteration of pelvis and involvement of upper ureter by protruding hypernephroma.

of equal degree as a result of renal neoplasm. In doubtful cases the pelvic deformity accompanying intrarenal neoplasm will ordinarily differentiate the two conditions. Occasionally, however, large extrarenal tumor will cause pressure that will result in great deformity of the outline of the pelvis; in such cases the differential diagnosis may be difficult. Outlining the tumor with an opaque catheter or locating it with a marker is of uncertain diagnostic value. In differentiating intrarenal and extrarenal tumor pyeloscopy may be of aid.

The deformity of the renal pelvis caused by the presence of tumor is characterized by a filling defect, pyelectasis, or both. In the early growth of papillary epithelioma the pelvic outline may be moderately deformed by irregular dilatation or abbreviation of one or more calies or by a filling defect in the renal pelvis. As the tumor increases in size, either a part or all of the pelvic lumen may be obliterated. It must be remembered that blood clots may cause a similar filling defect. In case of doubt it would be well to repeat the pyelogram after an interval has elapsed which is sufficient to permit the blood clot to reduce in size or be expelled. A filling defect in the pelvic outline may also be caused by fatty deposits, intrapelvic or extrapelvic, or by amyloid changes and edema of the renal papillae. The presence and degree of pyelectasis depends largely on the site of the tumor and its relation to the ureteropelvic juncture. If it is situated so as to occlude the ureter a variable degree of pyelectasis will result. In the early development of the tumor the pyelogram will usually show a moderate degree of pyelectasis with areas of filling defect corresponding to the tumor. As the hydronephrosis increases, the filling defects may become less important. Not infrequently the hydronephrosis will predominate and obscure any evidence of the primary tumor. Occasionally a large portion of the abdomen will be filled by the hydronephrosis. In a case of this kind recently observed a distinct fluid wave simulating ascites was noticeable in the abdomen.

Occasionally a cortical tumor will extend into the lumen of the renal pelvis so as partially to occlude it. It is rare, however, to find it so situated as to cause pyelectasis, but should this occur it would hardly be possible for it to be so extensive as it is in cases of pelvic tumor. While deformity at the ureteropelvic juncture and the adjacent portions of the ureter frequently accompanies intrapelvic tumor, occasionally a cortical tumor in the lower pole of the kidney may also extend so as to involve the first portion of the ureter and cause considerable deformity. The urogram may then show alternating areas of dilatation and contraction of the first portion of the ureter as the result of compression and retraction of the surrounding tumor.

In cases of tumor of the renal pelvis the cystoscopic data may be as significant as the urographic data. Metastasis occurring with papillary epithelioma of the renal pelvis will frequently involve the bladder. The metastatic growths, which may be either single or multiple, are usually situated in the base of the bladder near the affected ureteral orifice. They are round, pedunculated and tuft-like, usually not more than 1 or 2 cm. in diameter. Specimens removed for microscopic examination will usually reveal the nature of the growth. Their presence in the bladder coincident with hematuria from the affected ureteral orifice may ordinarily be considered pathognomonic of papillary epithelioma of the renal pelvis.

The effect of irradiation on renal tumor may be of some differential diagnostic value. Hypernephroma will not usually decrease in size following irradiation as does sarcoma and alveolar carcinoma. In one case of renal sarcoma the tumor was reduced to about a third of its original size. Irradiation has been applied to obviate the hemorrhage which frequently occurs with operations for hypernephroma. However, the resulting scar tissue renders enucleation so difficult that the good results obtained are usually offset by the difficulties of nephrectomy.

The treatment of papillary epithelioma of the renal pelvis consists not alone in nephrectomy, but, as many surgeons have emphasized, in complete ureterectomy. It is not sufficient to remove the portion of the ureter adjacent to the kidney, since metastasis may be present in the lower end of the ureter, and this cannot be determined through a lumbar incision. Complete nephro-ureterectomy is essential. Hunt[1] has recently emphasized the fact that not only is ureterectomy necessary, but that several centimeters of the bladder adjacent to the ureteral orifice should also be removed. He reports several cases in which metastasis had occurred in the portion of the bladder surrounding the affected ureteral orifice following ureterectomy.

The value of the clinical differentiation of cortical and pelvic tumors lies in the fact that one type of tumor will extend into the ureter and bladder and the other will not. Extension of a cortical tumor into either the ureter or bladder rarely occurs, whereas extension of tu-

mors of the renal pelvis into the ureter and bladder is common.

If, therefore, routine urologic examination is made in every case of tumor in one of the upper abdominal quadrants, whether or not there are any urinary symptoms, renal tumor will seldom be overlooked clinically. Furthermore, if renal tumor is present, it is advisable to identify its nature if possible and determine whether or not metastasis has occurred. The practical importance of recognizing whether there is metastasis to the ureter and bladder is self-evident since it may largely influence the success of the operation. The prognosis is also greatly affected by the nature of the tumor (*Figs. 1 to 11*).

REFERENCE

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DISCUSSION (*Abstract*)

Dr. Edward L. Keyes, New York, N. Y.—To me the interesting problem about renal tumors is that I diagnose them very badly. Dr. Braasch was good enough to note in showing us some of the pictures, that he had fallen down in his diagnosis. I confirm his commentary on his diagnosis, that it is extremely difficult, even with his experience.

Why do we diagnose tumors badly? Primarily because the parenchymal tumor gives bleeding and pain only when it has grown to considerable size. Even when the patient comes to us, we have difficulty in diagnosing the tumor that has not grown to a large size, and has not made great changes in the kidney pelvis. We may overlook some of the smaller tumors.

I wish to ask Dr. Braasch in what proportion of his cases would he guess that the pyelogram was the only diagnostic feature upon which he has ventured to advise operation. If a patient comes in with symptoms which lead him to suspect renal tumor, and he makes a urogram does he conclude on that evidence alone that it is a renal tumor? I hope to hear him say he has done this once or twice.

Just as biopsy is performed very gaily by many of us without consideration of the reaction that may be brought about, I can ask Dr. Braasch about trying to get an infiltration of the renal tumor by over-distending the kidney pelvis, if it happened that the symptoms pointed toward renal tumor rather than anything else. It seems to me these infiltration marks are often suggestive.

I would also ask if at Rochester they have the experience of finding implantations from pelvic carcinoma in the intramural vesical portion of the ureter. That, to me, is rather an important point, because very few patients with papilloma of the kidney that I get are young, and I do not like to do extensive operating if I can help it. I had a few years ago a very frail woman, aged 70, who came in with colic and then obstruction. The pyelogram showed an obstructing tumor and I did a nephrectomy, but did not wish to excise the bladder wall. I merely removed the ureter down to the bladder. She had an implantation tumor later in the bladder orifice. If that is going to be the case, if the tumors are going to be at the orifice I would not like to advise a total ureterectomy with excision of the bladder wall. This woman underwent what I consider a very much less radical operation, a suprapubic cystotomy and implantation of radium seeds, and she has remained well.

There is one thing that Dr. Braasch failed to mention: that the polycystic kidney pelvis is increased in its north and south dimensions. Not only are the calices lengthened and dilated, as he said, but the result of that combination of features is a very big kidney.

Dr. J. A. C. Colston, Baltimore, Md.—Some of the errors in diagnosis with us have been due to the presence of blood clots in the pelvis.

In reference to the papillomata which occur in the ureter, I have seen two cases that presented interesting features. In one the tumor was readily diagnosed and nephrectomy was performed, but we did not diagnose it as papilloma. This patient came back with implantation at the ureteral orifice, and we decided to do a complete ureterectomy. The day before we did this the patient was cystoscoped and a fulgurating wire inserted in the ureter. The intramural portion was then thoroughly fulgurated in order to destroy any tumor which might be present. The next day a small bit of mucosa around the bladder orifice was resected together with the entire ureter. I considered that this procedure was rational and it seemed to offer a better chance of preventing recurrence than that without the preliminary fulguration.

In a second case a nephrectomy for tumor had been done by another surgeon. Subsequently on account of persistent bleeding I advised a ureterectomy. He carried this out, but did not excise the orifice. I saw the patient several months afterward and a small recurrence was present at the orifice. I then fulgurated out the whole lower end of the ureter, as far as the wire would go. The first patient died of metastasis, and the last one is well.

Dr. George R. Livermore, Memphis, Tenn.—It is I think necessary to remove all kinds of irritation that may give rise to the production of tumors. Dr. Braasch cited several cases of obstruction of the ureter due to stricture in which if the patients had been given the benefit of dilatation they might not have had the tumors.

Dr. Albert E. Goldstein, Baltimore, Md.—Up to the present time we have always felt that the diagnosis of renal tumor was fairly easy, but the complications of such things as pyelonephritis and blood clots make it much more difficult to diagnose them. In tumor of the renal pelvis with pyelonephritis we get a filling defect in the pelvis and feel that we are dealing with adenocarcinoma. On two occasions I have seen cases with a diagnosis of possible adenocarcinoma of the kidney and opened the abdomen to do a ureterectomy and nephrectomy, but found no tumor in the kidney. Fortunately there was no infection in the kidney so we did no harm.

Calcifications in plain roentgenograms are confusing. The kidney pelvis will be fairly well outlined, with practically no encroachment in the outline of the pelvis or calyx, and the renal calcification occurs at one point. In a case of this kind in Baltimore we made a diagnosis of tuberculous kidney. A nephrectomy was performed and a hypernephroma with calcification was found.

Frequently we take a plain roentgenogram, think there is a stone and no pyelogram is made. We do a pyelotomy and find a beginning hypernephroma either in the

upper or the lower pole in addition to the stone. We should not depend entirely on the plain plate. This is important, first, because when we find a tumor and stone we wish to remove the kidney and this has not been considered in the first instance, and the patient's consent to remove the kidney has not been obtained. In one instance I was in this predicament in such a case, but the family physician was present and I obtained his consent to remove the kidney and the patient does not know today that she had a renal tumor.

Dr. Bransford Lewis, St. Louis, Mo.—I wish to know how long a period elapses before these nephrectomized patients with hypernephroma enter the Mayo Clinic. It is apparent from this remarkable demonstration of Dr. Braasch's that the final diagnosis rests largely on the roentgenographic findings. If we can get no such findings we are "up a tree." There are certain obstacles to making skiagrams. Recently I had a case in which I could get a ureterogram only a little way up. Examination disclosed a movable kidney, and it occurred to me that if we would turn the patient upside down, and push the catheter up in that position, straightening out the ureter, it would help us. This was done, and later we were able to push the catheter on up to the kidney. Another surgeon was unable to get a pyelogram in his case. I put in a tube with an opening at one end and then with forceful pressure injected through the narrowing that I found, and got a satisfactory pyelogram, that showed it was a case of hydronephrosis with stricture at the ureteropelvic junction.

Dr. Joseph F. McCarthy, New York, N. Y.—Dr. Keys, has emphasized the importance of ureterectomy. In Dr. Hunt's hands this is not so difficult as in the hands of many of us. I would suggest that an uretero-partial cystectomy be done as a second stage and as soon as the patient's condition warrants, thus anticipating the almost inevitable recurrence.

Dr. Gordon Craig, Sydney, Australia.—In visiting the urological clinics of Europe, Britain and America I have been struck by the apparent oversight of the anatomical fact that the kidney lies in the para-vertebral groove, much nearer the back than the front. If the kidney is pushed up from behind by applying firm pressure in the costovertebral angle with one hand, the other hand can feel any abnormality in the shape and size of the kidney. Since the advancement of laboratory technic there is a tendency to rely too much on these findings and to overlook what can be found out by the application of our five senses.

Dr. M. Q. Ewing, Amory, Miss.—As a general surgeon, I would like to know whether, with all the opportunities and work Dr. Braasch has had, he has been able greatly to improve the three- and five-year cures since deep roentgenology has been available. Metastases have occurred in many of my patients before they came to the surgeon.

Dr. Braasch (closing).—In answer to the first question of Dr. Keyes, whether anyone could possibly make a diagnosis of renal tumor from the pyelogram alone, I would say that although in many cases it undoubtedly can be done, we fortunately have other clinical data in most cases which help us very much. In some cases all clinical data fail us and we are compelled to rely entirely upon the urogram.

At our Clinic the urologist has to announce the diagnosis to the onlookers in the operating room before the surgeon opens the abdomen. In a case several years ago, the clinical and cystoscopic data had not helped us out at all in arriving at a diagnosis. Our internists said that a large abdominal tumor was an enlarged spleen. I could not determine definitely from the pyelogram whether the deformity of the pelvic outline was caused by pressure from an extra-renal tumor or by an intra-renal tumor. There were some distinguished visitors present in the operating room that morning. It was in my early days and I wished to make a favorable impression by an accurate diagnosis of the case if possible. Before Dr. Will came into the operating room I did something I have never done before nor since, namely, I asked the first assistant who was opening the abdomen whether the tumor was a kidney or a spleen. After he made the incision he made a manual intra-abdominal exploration and said it was a "peach of a kidney tumor." When Dr. Will came in with the distinguished visitors and large gallery of physicians, I confidently announced the diagnosis as that of renal tumor. Dr. Will snorted and pulled up a large spleen. Therefore, I claim that if a surgeon with his hand in the abdomen could not make the diagnosis, I certainly could not be blamed for not being able to do so.

The point which was made in regard to hematuria's appearing following pyelography is a good one. It is undoubtedly occasionally observed.

The suggestion of making a nephro-ureterectomy a two-stage operation is well worth considering. In many cases it would seem advisable to do the two-stage operation rather than the complete operation in one stage. Dr. Hunt suggested making a partial cystectomy, to include that portion of the bladder adjacent to the ureteral orifice, because we have observed a number of cases in which epitheliomata recurred just at the ureteral orifice. It is difficult to know why there is such a high late mortality in these cases. There is not usually distant metastasis, and one would think there was a good chance for cure. The bladder implants do not respond readily to fulguration or radium, and have a tendency to rapid and widespread recurrence. I well remember a patient we had not long ago on whom a diagnosis had been made elsewhere of polycystic kidney. The condition was pronounced inoperable. On abdominal palpation a large mass was felt in either renal area very suggestive of polycystic kidney. On cystoscopy, inspection of the left ureteral orifice showed thick pus and the appearance of the bladder suggested tuberculosis. On the other side there was evidence of hypertrophy as shown by a large normal pelvis, but with no deformity. The patient had a hypertrophic kidney, with a remarkably large pelvis and calices. As Dr. Keyes said, enlargement of the entire pelvic outline is suggestive of polyseptic kidney. There was no hypertension and no evidence of the nephrosis which goes with polycystic kidneys in a patient of fifty years. We removed the left kidney and the patient made a good recovery.

As to length of life after hypernephroma, one-third of the patients live over five years after operation, and we have had twenty-five or thirty patients who lived ten or fifteen years. Occasionally a patient returns for observation who has lived for twenty or twenty-five years. Nephrectomy for hypernephroma is unquestionably well worth while.

I wish to call your attention to an article written several years ago by Dr. Gordon Foulds on the pathology and prognosis with renal tumor. He does not use the term hypernephroma, but refers to these tumors as papillary adenocarcinoma. He divides them into two distinct groups according to two types of cell. One group with a very clear, mucous-like cell predominating is referred to as a clear-celled papillary adenocarcinoma.

This group has the best prognosis. If this type predominates you can say that the patient has a 30 per cent chance for a five year recovery and a 10 per cent chance for complete recovery. In cases where the granular type of cell predominates, the prognosis is about half as good. With the alveolar carcinoma the prognosis is still worse, the patients rarely living more than one year. We can differentiate as to prognosis with a fair degree of accuracy by employing the Foulds classification.

In closing I wish to state that the differential clinical diagnosis may be difficult, but in a large number of renal tumors, if all the clinical data are employed, it may usually be made.

THE DONOVAN BODY OF GRANULOMA INGUINALE*†

By J. A. McIntosh, M.D.,
Memphis, Tenn.

The Donovan body has been regarded as the causative agent of granuloma inguinale since Donovan[1] in 1905 described its association with certain granulomatous ulcerations in and around the external genitals. However, except for noting its constant presence in the lesions, such information as its cultivation in vitro, the mode of transmission, the incubation period within the body, and its nature have remained uncertain.

Because of these uncertainties a former study of the etiology of granuloma inguinale was published by me.[2] Much remained for additional study and it is a report of the continued study that is made in this paper.

HISTORY

According to Castellani[3] the discovery of the Donovan body post-dates the description of the clinical and pathological disease entity, granuloma inguinale. Much of the literature about granuloma inguinale consists of case reports, papers on prevalence and treatment, culture studies and animal inoculations of organisms obtained *in vitro* considered to be Donovan bodies, and descriptions of the histopathologic changes in the lesions. The disease is found largely among the negroid races, but emigration from southern to northern latitudes has distributed it widely. Only recently Sargent[4] reported the first case in Wisconsin. The intralesional destruction of the Donovan bodies following the intravenous injection of antimony and potassium tartrate was observed by Aragao and Vianna.[5] However, it is not clear how the destruction is accomplished.

The various organisms that have been cultured from the lesions of granuloma inguinale by different people have failed to produce experimental lesions comparable to those occurring spontaneously. Where experimental lesions were produced in laboratory animals either death or spontaneous recovery resulted. Some writers have regarded the Donovan body as a protozoan.

EXPERIMENTAL

The following experiment was made to ascertain the presence or absence of a filterable virus in lesions of granuloma inguinale containing Donovan bodies.

March 12, 1927, granulations were obtained from spontaneous lesions of E. S., a colored male, and placed in a sterile mortar.

Fig. 1

E. S. colored male, 35 years, showing bilateral inguinal spontaneous lesions of granuloma inguinale. Duration two years.

These were ground to a pulp in sterile saline, transferred to sterile centrifuge tubes and slowly centrifugalized for three minutes to sediment the heavier tissue particles. The supernatant fluid was removed and recentrifugalized. Stained smears of this latter sediment contained numerous Donovan bodies. The sediment was resuspended in the supernatant fluid and divided into equal parts. One part was filtered through a sterile Berkefeld filter and 2 c. c. of the filtrate injected into the left posterior axillary fold of E. S. Then 2 c. c. of the non-filtered suspended Donovan bodies were injected into the right posterior axil-

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†From the Department of Pathology and Bacteriology, University of Tennessee College of Medicine.

lary fold of E. S. A wheal was made in the epidermis at each injection with 0.5 c. c. and the remaining fluid was injected subcutaneously before the syringe needle was withdrawn. Sterile dry dressings were applied to the sites of both injections.

March 13, there was inflammation only at the site of injection on the right side.

March 14, inflammation was more severe with necrosis at the site of injection on the right side.

March 15, the necrosed area was 1 cm. in diameter with wide surrounding inflammatory edema. Temperature was 101° F.

March 17, a core of necrosed tissue was removed leaving an ulcer 1 cm. deep.

March 17, the ulcer was copiously draining grayish purulent material consisting chiefly of polymorphonuclear cells.

(2) The following experiment was made to ascertain whether the Donovan bodies existed in subcultures inoculated with organisms grown in cultures from the suspended material containing Donovan bodies in the former experiment of March 12, 1927.

Culture medium consisting of inactivated human blood serum one part and saline nine parts was inoculated with saline suspension of Donovan bodies and other organisms that existed in the spontaneous lesions of E. S. and cultured anaerobically seven days at 37° C. then removed and cultured 41 days at room temperature. Inoculations on similar medium was made from these 48-day cultures and incubated anaerobically for nine days at 37°C.

May 4, 1927, 1.5 c. c. of the 9-day subculture containing numerous coccoid and bacillary organisms observed in stained smears was injected intradermally into E. S. at the lower border of the right scapula 15 cm. below the experimental lesion of the right posterior axillary fold. Very little immediate tissue reaction resulted from the injection and this disappeared promptly.

Fig. 2

E. S. posterior aspect 84 days after receiving injection of nonfiltered and filtered suspension of Donovan bodies obtained from anterior aspect. (A) Note chronic ulcer in right posterior axillary fold at the site nonfiltered suspension of Donovan bodies. Note normal appearance of left posterior axillary fold, site of filtrate injection. (B) Site of subculture injection in experiment 2.

March 24, the ulcer had stopped draining and was completely healed except for small crust on the surface.

April 5, the ulcer was entirely healed and covered by epithelium.

April 22, there was slight induration at the site of the healed ulcer of the right side. The indurated area was aspirated with a sterile needle and syringe. Typical phagocytized Donovan bodies were observed in stained smears of the bloody serum obtained forty-two days after injection of the right posterior axillary fold. An ulcer having the characteristics of granuloma inguinale progressed at this site until treatment was begun June 8, or 87 days after the injection of the suspended Donovan bodies into the right posterior axillary fold.

The site of injection of the filtrate into the left posterior axillary fold gave no evidence of a developing lesion during the period of 87 days following injection.

June 7, thirty-five days after the injection there was a small, dark brown, slightly indurated area 1 cm. in diameter at the site of injection. (See Fig. 2.) The area was aspirated and bloody serum obtained. Stained smears contained many large mononuclear cells but no typical Donovan bodies were found. Treatment was begun on June 8, and further effort to find the Donovan bodies in this lesion was abandoned.

(3) The following experiment was made to ascertain whether the administration of antimony and potassium tartrate increased phagocytosis of the Donovan bodies *in vitro*.

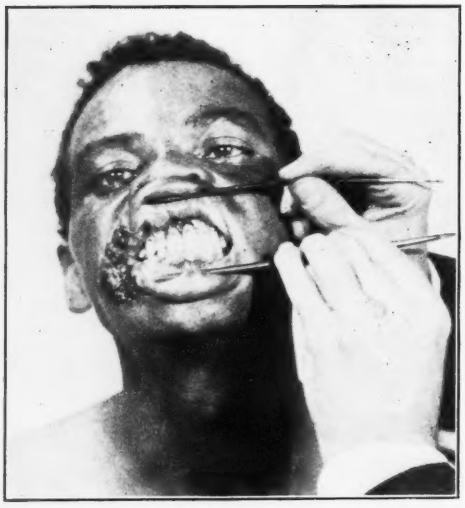

Fig. 3

O. F. colored male, 27 years, showing active spontaneous lesions of granuloma inguinale of right commissura labiorum oris and gingivae. Duration two years.

April 27, 1927 saline suspension of Donovan bodies was obtained from E.S., in the same manner as in former experiments. Blood sera and leukocytes were obtained from E.S. and O.F. after the manner of phagocytic tests. The former, E.S., had received no antimony salts, while the latter, O.F., had received intravenously 0.9 gms. of antimony and potassium tartrate twice daily in doses of 0.03 gms. The spontaneous lesions had healed.

Equal amounts of serum, washed leukocytes from E.S. and O.F. and suspended Donovan bodies from E.S. were mixed separately for the two individuals and incubated one hour at 37°C. Smears were made, dried and stained with Wright's blood stain. Greater phagocytosis occurred in the large mononuclear leukocytes of O.F., the treated patient. It was noticed that after intravenous injection of antimony and potassium tartrate the large mononuclear leukocytes increased in number in the peripheral blood and continued to increase for several weeks after the injections were discontinued. This observation and data on the elimination of antimony in the urine appears in the accompanying table.

(4) Because of the poisoning effect of quinine to protozoa in general according to Cushney[6] it was administered to C. W., colored male, who had recurrent lesions of granuloma inguinale, smears of which contained characteristic Donovan bodies. Two grams of quinine bisulphate was given daily by mouth for seven successive days. At intervals the elimination was followed in the urine. There was no clinical improvement in the lesions and the Donovan bodies continued to be present in smears made from them. Simultaneous leukocyte counts showed no variation in the number of the large mononuclear cells.

SUMMARY AND COMMENT

The experiments herein mentioned tend to prove that the Donovan body is the cause of granuloma inguinale as stated in the former study on the etiology of granuloma inguinale. A similar conclusion was expressed by Aragao[7] because of the morphology, reactions, and mode of reproduction of the organism. The constant association of the Donovan bodies in the characteristic lesions of granuloma inguinale has been observed in the lesions herein reported as well as in others coming under our observation.

Additional data on the lesion incubation period was obtained by auto-inoculation of Donovan bodies into E.S. The incubation time was five days less than that of a tissue graft previously reported in a paper on the etiology of granuloma inguinale. However, the concentration of the Donovan bodies may have been greater in the inoculation test. The incubation period was 42 days until a typical chronic ulcer began at the site of inoculation and from this it is believed that the incubation period is around forty days.

One experiment tends to show there is no filterable virus in the granulations of granuloma inguinale. But when the Donovan bodies are injected into the human a typical chronic ulcer develops at the site of injection. However, acute necrosis also occurs when other associated or-

Fig. 4

O. F. fourteen days later after 28 intravenous injections of 1% potassium antimony tartrate in 0.03 gm. doses had been received. Large mononuclear leukocytes had increased 182% above normal.

ganisms in the lesions are injected at the same time. Healing occurs in a few days and later, around forty days, the characteristic chronic ulcer develops.

A nine-day subculture from a 57-day-old primary culture of the material containing Donovan bodies grown in inactivated human blood serum diluted with saline injected into an untreated spontaneous granuloma inguinale patient produced a chronic indurated lesion, smears from which showed an excessive number of large mononuclear cells on the thirty-fifth day. The experiment was interrupted to begin treatment. Because there was a beginning lesion developing at the site of injection of the subculture near the incubation period of 40 days the presence of the Donovan bodies in the injected subculture is suggested. If present they were cultured *in vitro*.

Intravenous injection of antimony and potassium tartrate into the human produces a progressive increase in the number of large mononuclear cells in the circulation and enhances the phagocytic properties of this type cell for the Donovan bodies. It is believed that under the influence of the antimony stimulation the human body produces a sufficient number of large mononuclear cells capable of destroying the infecting organism called the Donovan body. The infection also causes a moderate increase of large mononuclear cells but the number or quality are incapable of completely destroying the Donovan bodies. Hence there is no spontaneous cure in granuloma inguinale. The drug is retained in the body for several weeks after administration which adds to its value as a medicinal agent.

TABLE I.—THE EFFECT OF 0.03 GM. DOSES OF ANTIMONY AND POTASSIUM TARTRATE GIVEN INTRAVENOUSLY TWICE DAILY FOR 21 DAYS UPON THE LEUKOCYTE COUNT OF O. F., COLORED MALE, AGE 27, HAVING RECURRENT SPONTANEOUS LESIONS OF GRANULOMA INGUINALE CONTAINING DONOVAN BODIES.

Date	Total leukocytes	Large mononuclears percentage	No. large mononuclears (normal 210)	Increase large mononuclears	Polymorphonuclears percentage	Lymphocytes percentage	Eosinophiles percentage	Basophiles percentage	Degenerating leukocyte percentage	Urine
		%		%	%	%	%	%		
April 8, '27	4800	6	288	37	60	32	1	1		
April 9, '27		11			60	29				
April 10, '27		9			61	30				
April 11, '27		6			66	28				
April 12, '27		10			62	28				
April 13, '27		7			65	28				
April 14, '27		9			68	23				
April 15, '27		8			62	30				
April 16, '27		13			56	31				
April 17, '27		12			62	26				
April 18, '27		7			63	30				
April 19, '27		8			65	27				+Antimony
April 20, '27		10			58	32				+Antimony
April 21, '27		10			64	26				
April 22, '27	6600	9	594	182	63	28				
April 23, '27		11			63	26				
April 24, '27		13			60	27				
April 25, '27		10			62	28				
April 26, '27		11			64	25				
April 27, '27		11			64	25				
April 28, '27		12			62	26				
April 29, '27	6032	11	663	215	63	26	Antimony and potassium discontinued.			
May 2, '27	5718	20	1143	444	50	29	1			+Antimony
May 9, '27	7850	11	863	310	61	25	3			+Antimony
May 16, '27	7275	13	945	356	60	20	1	3	3	+Antimony
May 25, '27	7050	10	705	235	58	26			6	Negative
May 30, '27	7270	7	508	141	64	28	1			Negative
June 6, '27	7400	5	370	76	47	47			1	Negative

All counts made after 12 hours fasting stomach on venous blood by the same person with the same hemocytometer. The tin test for antimony was used on the urine.

Quinine, a protozoa poison, has no demonstrable effect on the Donovan bodies, nor does its administration appear to influence the lesions of granuloma inguinale.

The nature of the Donovan bodies is still in doubt. It is believed that our experiment shows it was cultured. Continued effort will be made to isolate a single Donovan body or a group of them from active lesions and grow it in pure culture so that its nature may be more accurately determined. We have isolated two pure strains of organisms cultured from lesions containing numerous Donovan bodies only to have them refuse to produce experimental lesions comparable to spontaneous granuloma inguinale.

CONCLUSIONS

(1) Our data support the belief that the Donovan body is the cause of granuloma inguinale and that it has been successfully cultured *in vitro*.

(2) Destruction of Donovan bodies within the lesion of granuloma inguinale following intravenous administration of antimony and potassium tartrate appears to be accomplished by the large mononuclear cells.

(3) Antimony and potassium tartrate stimulates the production of the large mononuclear cells in the human when administered in small doses and increases the phagocytic rate for the Donovan bodies.

(4) No filterable virus was found in association with the Donovan bodies in active spontaneous lesions of granuloma inguinale.

(5) The experimental incubation period of the disease was forty-two days.

(6) In one patient, quinine, a protozoan poison, had no retarding influence on recurrent lesions of granuloma inguinale containing Donovan bodies.

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A PORTABLE FRAME FOR THE SUSPENSION AND TRACTION OF FRACTURES OF THE LOWER EXTREMITY*

By GUY A. CALDWELL, B.S., M.D., F.A.C.S., Shreveport, La.

One of the knottiest problems confronting the surgeon of today is the treatment of fractures of the lower extremity and particularly fractures of the shaft of the femur in adults. The unravelling of this problem has led to the use of numerous methods of reduction and fixation, each with a few advantages and many disadvantages. Although statistics show that here and there individuals and groups are securing uniformly good results by various ones of these methods, reports of end results from the country at large are most discouraging. Since the modes of treatment are very numerous no effort will be made to review them. It will suffice to enumerate a few of those in more common use, namely:

(1) Immediate reduction on a fracture table or similar appliance under anesthesia, followed by the application of plaster.

(2) Gradual reduction by the employment of light traction to relax the muscles (Russell).

(3) Fixed traction in a Thomas splint with or without suspension.

(4) Suspension of the leg in Thomas splint with sliding traction secured by adhesive bands to the skin.

(5) Suspension and skeletal traction by the use of calipers or Steinman pin.

Many excellent men are strongly opposed to the principle of skeletal traction but there nevertheless appears to be a definite, growing tendency to adopt it in most of the hospital fracture services throughout the country.

It is not the purpose of this paper to discuss the question of skeletal traction; the writer assumes that the method is indicated and useful in a definite group of cases, at the same time recognizing that certain difficulties and dangers are attendant upon its general use. The apparatus which will be demonstrated is designed to avoid these as far as possible and at the same time to be simple, economical, and efficient. The frame and modified Thomas splint embody no new principle and the frame is somewhat similar to others which have been previously described.

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*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-first Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

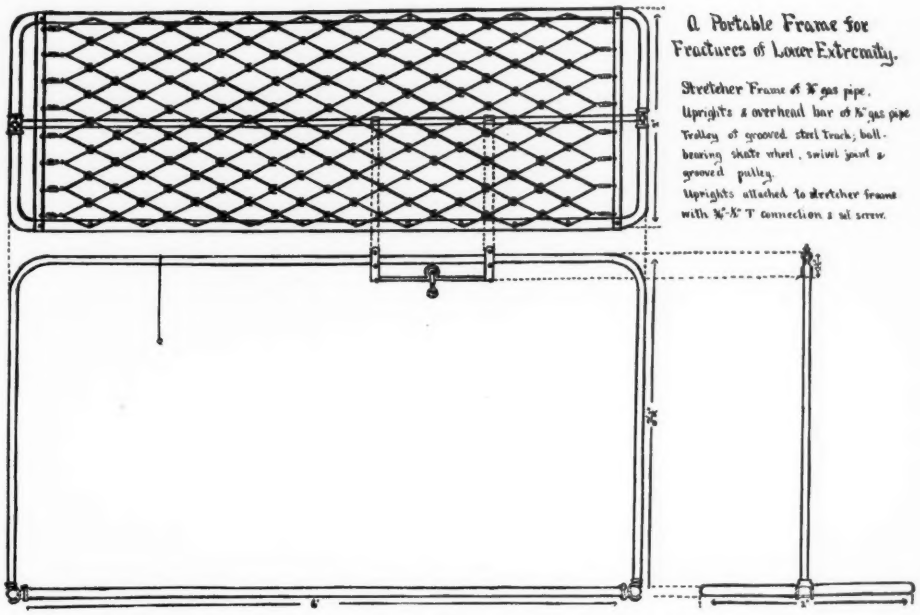

A Portable Frame for
Fractures of Lower Extremity.
Stretcher Frame of ¾" gas pipe.
Uprights & overhead bar of ¾" gas pipe
Trolley of grooved steel track; ball-
bearing skate wheel, swivel joint &
grooved pulley.
Uprights attached to stretcher frame
with ¾-¾" T connection & set screw.

Fig. 1

Skeletal traction as generally employed today demands some type of overhead frame which is attached to the patient's bed, the Thomas splint with a knee-flexion attachment, weights, pulleys, and cords for suspension; more weights, pulleys, and cords, for traction; metal or cloth bands with safety pins for slings to support the limb in the splint, and screw drivers, saws, gimlets, and other tools to adjust the frame and pulleys. All this harness effectively fixes the patient to the bed and the bed to the room. Furthermore, periodic x-rays are essential to follow the progress of reduction in order to gauge the amount of weight to be used and, since the harnessed patient cannot be taken to the x-ray room, the portable x-ray has become an absolute necessity.

The care of the patient in such apparatus calls for a corps of specially trained assistants and, even when aided by these, one has difficulties such as occur when the weight cords hang in the pulleys, the slings become loose, or the weights are removed by solicitous visitors. Taken all together, the system is entirely too complicated for interns and nurses who rotate on the service every two to three months. In the small private or community hospital the apparatus is bunglesome and regarded as impracticable and the demands for a portable x-ray are too infrequent to justify the investment of $1,000.00. One may suggest that such cases should be transferred to institutions having these facilities and a trained personnel but, so long as this is a free country, the majority of cases will be treated in the nearest hospital regardless of facilities. Hence, it would be wiser to provide, if possible, a simplified and economical apparatus adapted alike to the needs of the small private institution and the large charity hospital. Moreover the pay-patients of moderate or small means who compose a large part of the total number, can ill afford to be chained to a hospital bed for six to twelve weeks. These conditions are cited as the indication for a simplified means of applying skeletal traction in fractured femurs.

In order to meet the situation it seemed necessary, first, to design a light but sturdy portable bed with overhead suspension and, secondly, to modify the Thomas splint in such a way as to do away with weights and pulleys.

The problem of the portable bed was easily solved. The idea of a Bradford frame with uprights and an overhead bar of gas pipe suggested itself, was tried, and found practicable. Later it was found that cot springs and a thin mattress could be substituted for the canvas cover of the Bradford frame with greater comfort to the patient and even better results. The trolley

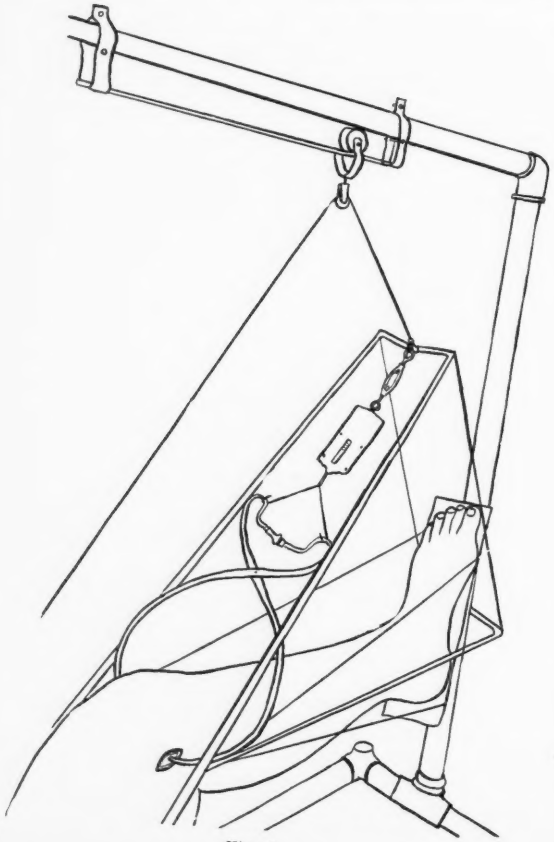


Fig. 2
Detail of application of fixed traction in Thomas splint with pierson attachment.

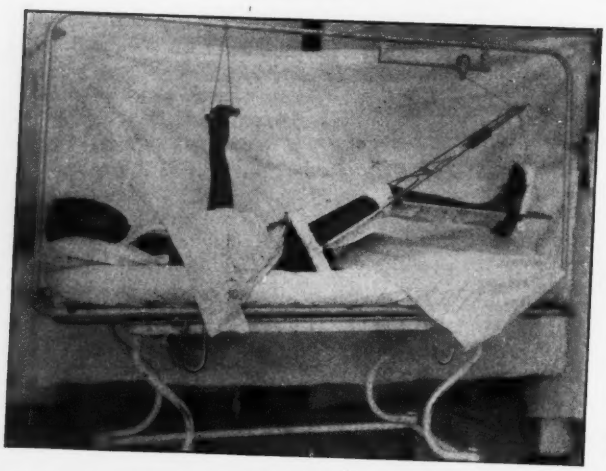


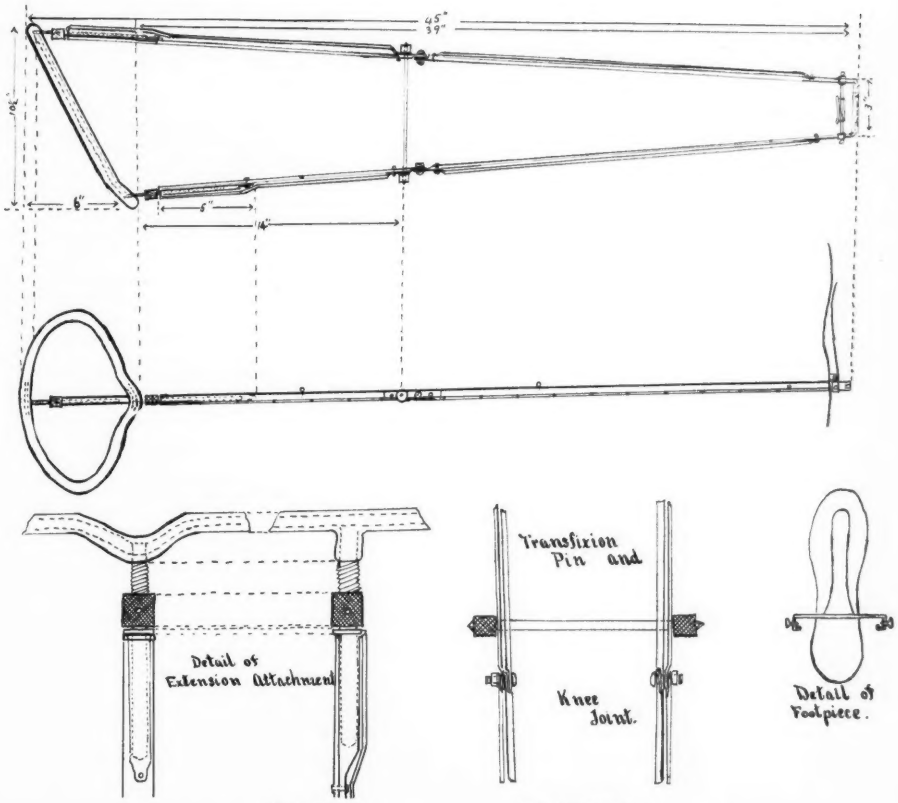
Fig. 3
Fixed skeletal traction in Thomas Splint, suspended in portable frame.

suspension as used by Blake, was added, making it more effective by the use of a metal track and a ball-bearing skate wheel with a grooved pulley on a swivel joint beneath.

The matter of the splint was more difficult. If no weights were to be used some type of fixed traction was essential. The traction must be readily adjustable and with some scale for measuring the force applied. By attaching a turnbuckle to the end of the Thomas splint and interposing a spring scale between the caliper and turnbuckle, this difficulty was solved.

Five cases of fracture of the shaft of the femur in adults were treated in this apparatus. Reduction was accomplished in the minimum time, as indicated by x-rays. It was found that, once adjusted in the apparatus, the patient was comfortable and required almost no attention. Two of these cases after reduction was complete, were sent to their homes for four weeks by ambulance or on the train, and returned with the apparatus still perfectly adjusted and with good apposition and callus formation about the fracture. This procedure is not recommended but is merely cited to prove the portability and security of the apparatus.

Feeling that the use of the Steinmann pin is perhaps preferable to the calipers, the splint was modified further. The side bars were made for ⅜x⅝ inch flat steel with a joint opposite the knee arranged with a bolt and nut in such a way that it can be made freely movable, or fixed at any desired angle of flexion. A 1/4 inch steel rod, 4 inches long, threaded and fitted with a nut, was welded to the ring on either side. A tube 5 inches long and large enough to receive these 1/4 inch rods was welded to the upper portion of each of the side bars. Holes, 3/16 inch in diameter, were drilled in the flat side bars, 1 inch proximal to the knee joint to receive the ends of the modified Steinmann pin. The



(Top) Fig. 4 (Bottom) Fig. 5
Modified Thomas Splint with extension attachment and transfixion pin.

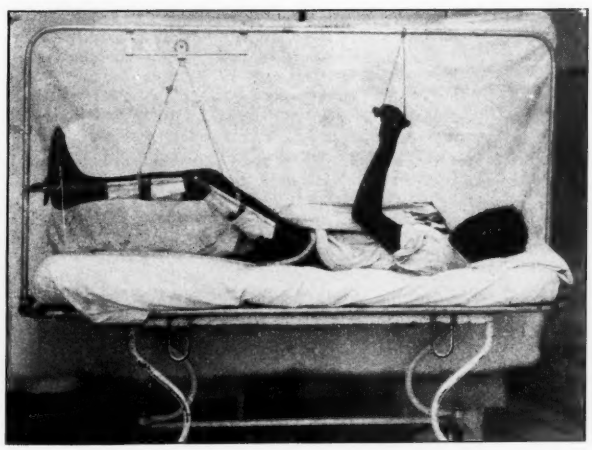


Fig. 6
Modified Thomas Splint, extension attachment and transfixion pin, suspended in portable frame.

pin was made of 1/8 inch steel rod, 7 3/4 inches long, pointed and threaded at each end, and fitted with nuts. The lower ends of the side bars were rounded and turned in at a right angle as in a caliper splint, and fitted into a tube 3 inches long. A detachable and adjustable foot piece which was fixed on an axle and controlled by a spring, was provided to support the foot at a right angle and permit active motion of the ankle.

In applying this splint, the ring is first slipped over the leg and placed in position and against the tuberosity of the ischium. The region of the knee is then prepared and draped; the modified pin is inserted and the wounds dressed

as usual. The side bars are then connected to the ring and the projection ends of the Steinman pin are passed through the holes in the side bars and the nuts fitted on. Slings are then adjusted under the leg and thigh, and the splint is suspended from the overhead trolley. By tightening the nuts below the ring against the ends of the side bars, active extension is made on the fragments of the femur.

This modified splint has but lately been completed and has been used in only two cases but with good reduction, apposition, and union in both. These patients were even more comfortable than those on whom the calipers were used, and the apparatus required the minimum attention.

The use of the Thomas splint and portable frame for fixed traction with adhesive has been tried in suitable femur and leg fractures and found equally practical. Likewise an arm attachment along the lines of the excellent apparatus described by Dr. Conwell, has been attached to the portable frame and found to be helpful.

In conclusion, this apparatus which is merely an adaptation and modification of various appliances now in use, is recommended as being simple to apply, requiring very little adjustment, relatively inexpensive, being efficient as to results, and easily transported to the x-ray or operating room, the porch, or yard, or to the patient's home if so desired.

DISCUSSION—*Abstract*

Dr. H. Earle Conwell, Fairfield, Ala.—The treatment of fractures of the femur is one of the most difficult in the body. The frame which Dr. Caldwell has described and shown here is one of the neatest arrangements for extension and suspension which I have seen. It has less complications and is easily assembled and can easily be moved about in the ward without danger to the patient or fracture. The foot drop arrangement which he has devised is also to be commended.

In the service of the Employes' Hospital of the Tennessee Coal, Iron and Railroad Company at Fairfield, Alabama, I have found that ideal results have been obtained by suspension and extension with application of calipers in the condyles of the femur using a type of overhead frame similar to that described by Dr. Caldwell.

Sometime ago I reported a series of 110 cases of fractures of the femur in *Surgery, Gynecology and Obstetrics* and also showed the type of overhead frame which we used in this series of cases. The idea of this frame is practically the same as Dr. Caldwell has described here. In no case had we any infection where calipers were used except a few slight local skin infections which cleared up in a few days. One mistake which is usually made in applying calipers is that one is inclined to leave them in the condyles too long. If the calipers are removed as soon as sufficient callus formation is present to prevent mal-position much better results will be obtained. The average time for the removal of calipers was around the thirty-fifth day.

The question was brought up regarding the hospitalization of femurs. In my opinion the treatment of the femur should be considered a major surgical operation. It demands as great care as an abdominal operation and I cannot see why one is inclined always to object to having these cases treated in the hospital. The responsibility is too great to treat them elsewhere. I would not take the case unless it could be treated in a hospital. As to the financial side of the treatment, if any member of a family had an acute attack of appendicitis there would be no hesitancy whatever in sending the patient to a hospital. The incidence of appendicitis is much greater than that of fractured femur. Therefore, why object to an apparent minor detail when these major details are to be considered?

The question was brought up of transporting the patient in a bed with Dr. Caldwell's splint. I am sure Dr. Caldwell did not intend to infer this. A fractured femur should not be transported except by the standard method, that is, the Thomas splint. Any method which uses suspension and extension enabling great care to be given to adjoining joints as well as soft structures, nerves and blood vessels is ideal for treating fractures of the femur. The splint of Dr. Caldwell fulfills every part of this treatment and should certainly be used whenever possible.

Dr. F. Walter Carruthers, Little Rock, Ark.—For you men who work in industrial sections and have your patients brought to you, it is all right to say that fractures must be treated in the hospital. We who have to deal with Tom, Dick and Harry over the country find it a little more difficult to make that statement. Therefore, I feel that this type of frame, which is very simple, fills a place that we need badly. It is one on which you can transport the patient easily in a baggage car. Apparently it can be made more or less permanent, and is not difficult to care for.

A fracture has to be seen every day. Something may slip and that little something may mean a successful reduction of the fracture, and a complete functional result.

There are many types and methods for treatment of fractures, and there are no simple fractures. There are certain fractures on which we may use the Steinman pin, but the promiscuous use of it on simple fractures is bad.

Dr. Alphonse H. Meyer, Memphis, Tenn.—I can see that Dr. Conwell does not function under the Compensation Law of the State of Tennessee. The State of Tennessee allows only $100.00 for full medical aid, and you can readily see where a patient with a fracture of the femur would be, with a long stay in the hospital, coming under that particular law.

Hospitalization, today, is a luxury, as well as a necessity, and only the rich and the very poor can afford it. The rest eventually go bankrupt, more or less, through the medium of the physician and hospital.

Dr. J. S. Speed, Memphis, Tenn.—We, at our clinic, are exponents of the cast method of treating fractures of the femur, for two reasons: first, we believe that a large majority of these fractures can be immediately reduced, placed in cast, and held there. We have done this in a number of cases; and, secondly, as Dr. Meyer pointed out, the question of hospitalization is a most

important one in private practice, and particularly private practice in this locality, where the cotton is not very high and the finances are very low. We have to take that into consideration.

Any treatment of fractures of femur, which involves the use of a Steinman pin, must be considered very carefully in regard to the complications which may arise. I am fully aware that in well conducted hospitals, such as Dr. Caldwell has, where the most careful attention can be given to these cases it can be used very satisfactorily. On the other hand, the method is not without complications in the hands of the average man.

I think that Dr. Caldwell's splint is an excellent splint, which is going to be very useful. In his discussion, I would like him to point out the fact that each one of these splints must be made for the individual case, if it is to be entirely satisfactory. A Thomas splint which does not fit properly is a very dangerous thing to use in the treatment of fractures. Everybody's leg is shaped differently, and it requires a splint that fits properly to hold the fracture in position. There is nothing worse than a Thomas splint ring twice too large, or a Thomas splint with a knee joint which cannot be adjusted satisfactorily. A word of caution should be said in regard to the use of splints. Unless they are very carefully watched afterwards a slipping of the fracture or other complications is liable to result.

Dr. A. E. Chace, Texarkana, Ark.—There is no criticism whatever of this method of treating fractures. It has been suggested that it be used for transporting them. I think that is a mistake. An apparatus that depends on weight traction has no place in the transportation of fractures. Any one who has tried to lie on a cot in a baggage car will appreciate how extremely unsteady it is, and trying to transport a fracture, with weight traction is a bad practice. Fixed traction is the only method for transporting fractures.

Dr. Kellogg Speed, Chicago, Ill.—I agree with Dr. Chace that anything depending on balanced weights or suspension traction is not to be used in transportation. I have used the Steinmann nail since 1913, I suppose five hundred times. I have never had any difficulty with it, but do not use it in more than three or four cases out of a hundred. There is no objection to a caliper, if you wish to use it.

Dr. Speed has spoken of his success in plaster of Paris treatment for fracture of the shaft of the femur. Most surgeons are not so adept and I do not know whether the rest of us could use it or not, but if we wish to adopt a more or less routine method, the traction method certainly fills the bill.

You can not obtain abduction in a limb by means of suspension traction unless you put both legs up. Then, you can get abduction, but to put one leg up and say "This frame is no good" because you can not put the leg out here is a mistake. Consequently, this type of treatment has nothing to do with the treatment of fractures of the neck of the femur.

Dr. Caldwell (closing)—I gather from Dr. Conwell's remarks that he feels that the frame does not provide for adequate abduction and flexion. I would like to remind him that I have limited the use of the frame to fractures of the shaft of the femur. Abduction is not essential except in the region of the trochanters and neck. If he will again look at the apparatus, he can see that by shortening the suspension cord and by shifting the position of the trolley, any desired angle of flexion of the hip can be obtained.

It is essential, as far as is compatible with safety, to adapt the treatment to the circumstances of the patient. Portability of the patient in his apparatus is desirable even in the hospital, particularly in those hospitals where the portable x-ray is not available. There is no question about the advisability and necessity for such cases to be reduced in the hospital where x-ray facilities are available for control. Within ten days or two weeks, however, this can be accomplished, and if the position is satisfactory, the patient can be moved to the porch or yard, or can be sent home and looked after by the surgeon on daily rounds.

I agree with Dr. Kellogg Speed that it is not possible to maintain abduction of the thigh in any kind of apparatus except by abducting the opposite leg in another splint. The cost of the frame, mattress, and overhead bar is thirty-five dollars. If a Thomas splint and Pierson flexion attachment and tongs are used, they cost about fifteen dollars more. If the modified Thomas splint and Steinman pin are used, they cost about thirty dollars. In our work the hospital has furnished these, and reclaimed them when the patient was released.

In all cases in which fixed traction is employed, one expects some complaint of pressure against the tuberosity of the ischium. Careful instructions to the patient and attendant in the care of the skin will overcome this. Moreover, it is not a frequent complaint when the splint is suspended because the body weight supplies counter traction and pulls the ischium away from the ring.

I had hoped to limit the discussion to the merits of this particular apparatus in cases where skeletal traction is definitely indicated. I am quite aware that Dr. Speed, Dr. Campbell's associate, has remarkable success in reducing femurs and retaining them in plaster. I am sure, however, that I am not alone in finding a considerable number which I cannot reduce by manipulation, but in which I can secure good results by skeletal traction. I recognize its dangers, but maintain that in the hands of the average surgeon these are less than the dangers associated with open reduction, which is our other choice.

I am indebted to the Surgical Appliance Company of Shreveport, Louisiana for their valuable assistance in making the frame, and for their courtesy in sending it here for demonstration.

NEPHROLITHIASIS*

By GEORGE R. LIVERMORE, M.D.,
Memphis, Tenn.

I shall try to give you a brief outline of what is known today about nephrolithiasis. The first thing is the cause. There is a dispute in regard to the cause of kidney stone, from the fact that there are many different theories. The theory that is most generally accepted, however, is that

*Clinic, Clinic Session, Southern Medical Association, Twenty-First Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

of infection. The work done at the Mayo Clinic by Rosenow, in which he took infected material from kidneys containing stones and put it in the tooth pulp of dogs and reproduced stone in the kidneys in many of the animals, seems to prove that the formation of stone is due to the activity of a special streptococcic germ. Therefore, in the treatment of these cases we should look for foci of infection and try to eliminate them in order to prevent the re-formation of stone.

Many persons think that diet and mineral water play an important part in the formation of stone. In many localities where the water is charged with minerals the percentage of nephrolithiasis cases is greater than elsewhere. We know, too, that individuals who are large meat eaters and lead sedentary lives are liable to this difficulty. Some of the salts will crystallize out, particularly in the form of uric acid, and they get uric acid stones. These theories all have their advocates.

Dr. Hunner, who put ureteral stricture on the map, says that stricture is the chief cause of stones in the kidney and ureter, and that if we will treat the stricture after the stone has been removed we can prevent the re-formation of stones.

The colloid theory is that the normal colloid constituents of the urine are changed and there is a deposition, or precipitation, of the salts of the urine, with the resultant formation of stone in the kidney.

You will remember the old idea that in order for stone to form there must be a nucleus. That belief still seems to be prevalent: that there must be a blood clot, a clump of pus, or something else on which these crystals can collect and form stone. So much for the theories regarding the formation of stones. In my opinion stasis and infection are the chief causes of stone in the kidney, and as we do not have stones in every case with stasis and infection, faulty metabolism must be the remaining factor that when present with the other two is certain to result in stone formation.

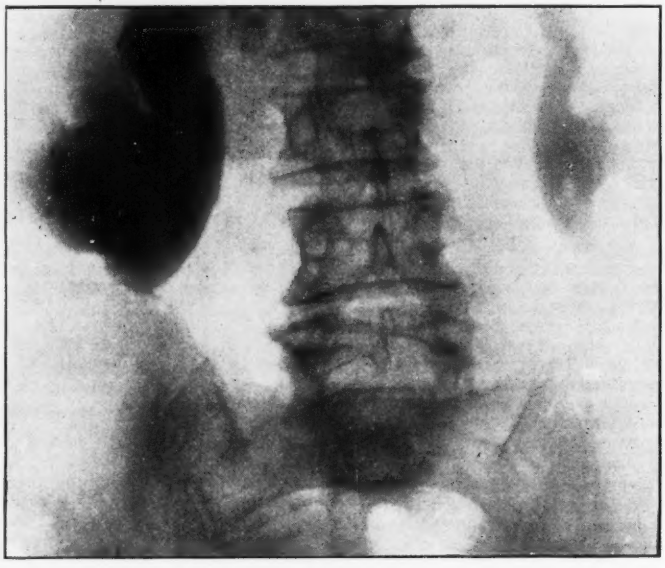


Fig. 1.
Bilateral nephrolithiasis. On left stone fills pelvis and calyces. On right same condition although stone much larger and shows marked destruction of kidney.

The symptoms vary all the way from none at all in the "silent stone" which may be discovered when we make a skiagram for gunshot wounds, or fractures, to very severe symptoms. In the silent stone cases there are no subjective symptoms, but perhaps a little backache. The obstructing stones cause the most excruciating

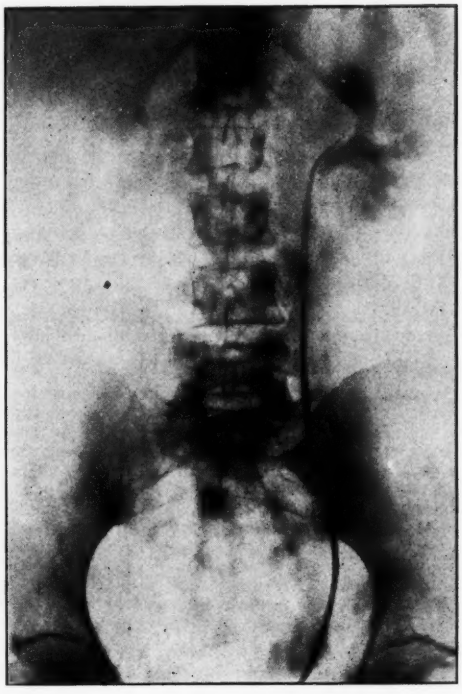


Fig. 2
Calculus completely filling calyces and pelvis, left kidney. Patient had right nephrectomy for tuberculosis ten years. No tuberculosis found in urine now and guinea pig inoculation negative.

symptoms to which flesh is heir. Having been a sufferer from kidney stone, I can speak with feeling on this subject. It often requires morphin in extremely large doses to bring about relief. Regardless of whether the patient has subjective symptoms or not, there will be objective symptoms that will help you to make a diagnosis. There will be pus, blood, epithelial cells and perhaps crystals of uric acid in the urine, but I do not place much reliance on uric acid crystals. The skiagram is of the most assistance to us, for it shows stones in 70 to 75 per cent of the cases. From 30 per cent on there are cases in which the x-ray will not reveal the stone. This is particularly true when the stone is composed of materials which do not cast a shadow such as cystin, xanthin and uric acid. In order to bring them out we can frequently coat the stone with some pyelographic media which will make them visible on another plate. One thing to remember is that when no stone is found and we make a pyelogram and inject the kidney and find an area of lighter density than the pyelographic material, we can assume that this lighter area is a stone. In addition to this, we have the wax-tipped catheter, which we pass through the cystoscope and into the kidney pelvis. If there is a stone in the pelvis we get an impression or scratch on the wax as it strikes the stone. Recently there was brought out a ureteral catheter with a wire in it which will transmit the sensation on striking the stone. This has been found of use particularly in cases of ureteral stone rather than in those in the pelvis of the kidney. If the stone were in the kidney parenchyma this little instrument could not reach it.

Stone in the kidney is a foreign body and any foreign body in the kidney should be removed. This is a broad statement, but it has been my experience and I think most urologists will bear me out, that if a small stone is seen in the kidney, within a few years it will grow, the function of the kidney will be damaged, and frequently malignancy results. A patient who had a small stone some time ago and refused operation was seen again recently and the stone was found to be four times its original size and there was a large abscess cavity around it. The patient was cystoscoped, functional tests were made, and this kidney was found to have practically no function at all. We removed the kidney and I was surprised to find that the patient had a hypernephroma the size of a silver dollar in this kidney. I believe that if the stone had been removed when it was first discovered this would not have occurred.

Let us remove these stones before they can damage the kidney and produce these effects. I wish to qualify the statement that all stones should be removed. There are some types we do not wish to operate upon, for we do not wish to kill the patient. If the condition of the patient is such that operation will probably result fatally, I should be in favor of washing out the kidney and giving the necessary things to improve the function.

Presenting slides of double nephrolithiasis with stones filling the entire pelvis and calyces. This patient, a lady of 72 years, has been carried along for several years by washing out the kidney. Occasionally we have pus accumulating behind this stone, but by slipping in a ureteral catheter and washing it out the difficulty is relieved.

I wish again to qualify the statement that all stones should be removed by saying that in old,

debilitated patients, and in cases in which kidney function is very bad, I certainly would not remove them as in the case just cited.

One of the diagnostic means of finding out where the kidney stone is, which is quite satisfactory, is to fill up the pelvis of the kidney with a pyelographic material and to see whether it covers the stone. As you see here (indicating on slide) in case of stone in pelvis of kidney, the stone is entirely covered by the media, showing that it is within the pelvis of the kidney.

(Slide.)—This is a patient in whom we suspected a hypernephroma. We knew she had this large stone, and also that she had cholelithiasis. This patient had a kidney which reached down to the crest of the ilium and was as large as a child's head. She was definitely septic, having chills, high fever and sweats. We slipped in a catheter and drained her kidney until the temperature became normal. Later she had a flare up, so we took her to the operating room and drained the kidney and later did a nephrectomy. She made a nice recovery and has since had her gall bladder removed.

There is a controversy in regard to the procedure of cutting into a kidney to remove a stone. Some experiments have been carried out by good men, who have cut into the kidney.

Dr. Goldstein, of Baltimore, some years ago, working with dogs, took the dogs' kidneys and split them from pole to pole. He then held the kidneys together until the bleeding ceased entirely, putting in no sutures. He replaced the kidneys, closed the incisions and returned the dogs to their cages. Some of the dogs, on coming out of the anesthetic, floundered all over the cages and were active otherwise and had no hemorrhage. After these dogs had been well for months he removed the kidneys and examined them, and was much surprised to find very little damage to the kidney parenchyma. Pflaggemeyer and Cummings, of Detroit, did the same thing and found that the function of such dogs tested with phenolphthalein was as good as before the operation. Microscopic sections of the kidneys showed practically no damage to the glomeruli and tubules of the kidney.

I wish to show one plate of a woman, aged 56, with a large kidney stone. We have carried her along with lavage for two years and she is quite comfortable. She had one kidney removed several years ago because of tuberculosis. When she came to me first this stone filled the entire pelvis and the calyces as well, and the function of the kidney as shown by 'phthalein test was 5 per cent in fifteen minutes. Kidney stones are like snow balls. When they once form every day something is added to them, and if left alone they will ultimately destroy the kidney.

COMPOUND FRACTURES*

By MUIR BRADBURN, M.D.,
New Orleans, La.

Compound fractures are interesting because of the conflicting opinions as to their management, particularly with regard to internal splinting.

If we compare two recent works on fractures, in one ("Fractures and Dislocations," Wilson and Cochrane) we find:

"Internal fixation not advisable. Of late years many surgeons have inclined to the application of metal splints or bands for the direct internal splitting of the bones in compound fractures. These were for temporary use only and were removed when union had occurred. Good results were obtained and the method was justified by the inability to secure alignment of the bones or satisfactory fixation with the apparatus then in use. It is obvious, however, that such internal splints are foreign bodies and that their presence is detrimental to clean wound healing. Moreover, the various splints developed during the war for the treatment of compound fractures maintain reduction and alignment equally well and are not open to the same objection. For this reason, the method has now been superseded and only in rare and exceptional cases is the direct application of metal or other fixative materials to the bone advisable."

In another work ("Fractures of the Humerus, Radius and Ulna," Eliason) we read:

"The question naturally arises as to the use of internal fixation in these cases. . . . Our practice has been to apply internal fixation where the line of fracture is such that the fragments will become displaced easily. We do not use it in great comminution, but in oblique or short spiral fractures we advocate it at times. . . . The chief arguments against internal fixation in compound fractures are that it opens more bone to infection, that the bone will die and the plate will become loose and act as a foreign body. These are all poor arguments. Internal fixation will hold the fragments for ten days to two weeks, even in the presence of infection. How much better for the fragments to be held properly reduced while the inflammatory exudate stiffens the muscles and tendons around them, tending to hold them in place, than to have the same stiffening occur around the displaced fragments, which displacement must persist until the infection has subsided and the wound has been healed for at least six months."

These two views are representative of the attitude of the two opposing groups. Some surgeons are more vehement in expressing opinions against the use of internal splinting. One of my confreres who has done a great deal of excellent work in fractures is unalterably opposed to the use of internal splinting, and each of us

*Read before the Southern States Association of Railway Surgeons, Auxiliary of the Southern Medical Association, Twentieth Annual Meeting, Atlanta, Georgia, November 15-18, 1926.

seems to strike a stonewall in discussing this subject with the other. I believe internal fixation in selected cases to be of great value. These cases we shall discuss later.

The mismanagement of compound fractures means not only the prolonging of the period of disability but great impairment of function and at times loss of limb or life.

As far as treatment is concerned, compound fractures are classified as follows:

(1) Those in which the skin wound is small, as occurs in fracture from within out.

(2) Those in which the skin wound is large.

(3) Those in which there is considerable comminution.

The methods are modified also by the time after the accident at which the case is seen and by the bone affected.

In the first group, that in which the skin wound is small, it is our practice to shave the limb, using benzine-iodin instead of soap and water. We then cleanse the wound with benzine-iodin, followed by iodin and reduce the fragments under general anesthesia. A dressing and splint are applied. If the case comes to us in a temporary splint with preliminary measures such as shaving, already completed, we wait if the fragments are in good position about seven to nine days. At this time if the temperature is normal and the wound in good condition, we treat the fracture as a simple one and apply, as in the case of the leg, a plaster cast. However, in the case of femur fractures in young adults, all, both simple and compound fractures, are treated from the beginning by skeletal traction.

I not infrequently in cases of this type cut away about 0.5 mm. of skin at the edge of the wound, and excise easily exposed fascia and cleanse again with benzine iodin. I find a tendency with some surgeons to insert a drain or a pack into the opening. This I believe to be a mistake in management. If there be bleeding sufficient to require a pack, the source should be sought and a ligature applied. We examine all cases as soon as they come to us and remove all packs and drains that have been placed in recent fracture (eight to ten hour fractures), as these invite infection.

In the second group, that in which the skin wound is large, we find that our method of treatment differs with the bone involved and the time after injury at which the patient is seen. It is in this group particularly that we find opposing views as to management. These cases should be given a general anesthetic and the wound debrided. In civil practice I have rarely found it necessary to remove more than 2 mm. of skin at the edge of the wound. I rarely have cases of extensive muscle injury requiring considerable excision. I have, however, paid particular attention to exposed subcutaneous fascia whose resistance to infection is low. All damaged fascia is excised freely, likewise damaged tendons receive considerable attention. As to bone fragments in our debridement, I believe we should be very conservative. In this regard, I should like to contrast two cases:

Case 1, Fig. 1 is a compound fracture of the second phalanx of the index finger with a large skin wound and loss of the greater part of the second phalanx. The middle finger also had a large skin wound; in addition, the phalanx had been split, and the split portion was hanging out of the wound attached by only a small piece of periosteum. The loss of this did not impair the middle finger, but in the case of the index finger a stable member could not be obtained. I, therefore, decided to use the detached portion of the phalanx of the middle finger as a graft in the index finger. This fragment was washed in sterile saline and inserted between the two exposed joint surfaces in the index finger after I had cleansed the wound with benzine-iodin. A finger splint on the Thomas principle was applied; a Keith needle was passed through the terminal phalanx and traction maintained by the use of rubber bands passed over the

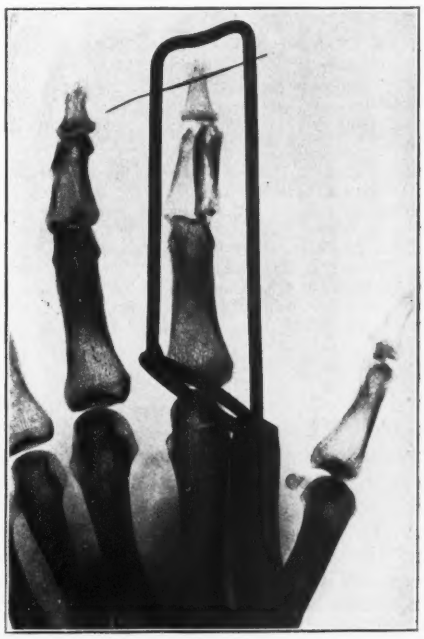


Fig. 1. Case 1

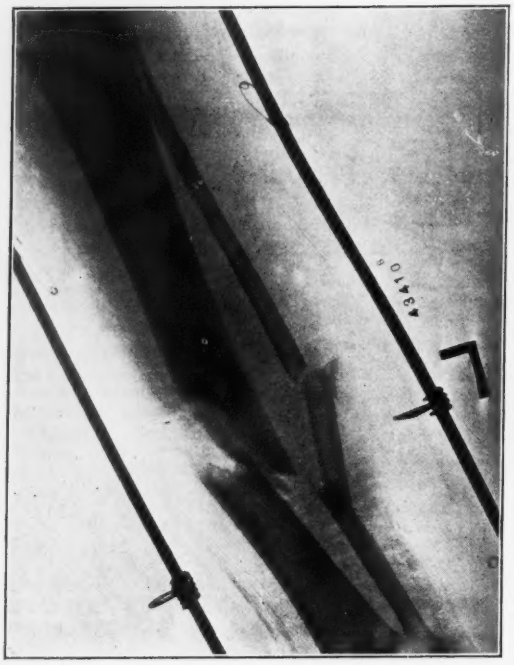


Fig. 2. Case 2

end of the splint and attached to the exposed needle ends. The wounds healed by primary intention. In this case of compound fracture, this completely detached bone fragment served as an excellent graft. This man, injured on May 8, 1926, returned to work on September 7, 1926.

Case 2, Figs. 2, 3, 4, had a compound fracture of both bones of the leg. The fracture was comminuted and at the preliminary cleansing the operator removed a large fragment of bone. This one act alone would have prolonged his disability about one to one and one-half years. The author believes that that fragment should have been given an opportunity to act as a graft as in *Case 1.* This case, which came to us subsequently for treatment, we believe, was improperly treated in the beginning.

I should like to point out what we consider errors in the treatment of compound fractures of the leg which constitute 70.5 per cent of our compound fractures. As this case was seen by the operator (a man of considerable ability) within one hour after the accident, we believe it to have been an error not only at this time but at any time to have placed large thick rubber through and through drainage tubes under the bones. Error No. 1 gave us a pressure paralysis with subsequent development of trophic ulcers. Error No. 2 was the removal of a considerable fragment of bone. Error No. 3 was the making of a large incision directly over the tibia, which was allowed to remain open for drainage purposes. Error No. 4 was the use of a large pack. The surgeon subsequently remarked that the only mistake he had made in this case was that he had not amputated. This would have been the greatest mistake, as the patient now has solid union and the sensation and function have returned. The large incision over the tibia for drainage purposes is still not completely healed, the fracture having occurred twenty months ago. From present indications the patient could not return to laboring work for at least six months.

I have gone into some detail in this case, as the first management of it indicates a tendency of some surgeons to anticipate pus. If pus is anticipated in handling compound fractures, you will nearly always get it.

Contrast this case with the following:

This patient (*Fig.* 5) (W. B.) was admitted within four hours after the accident. He had an extensive skin wound; a large area of subcutaneous fascia was exposed, and the peroneal tendons were badly shredded. Under a general anesthetic, the leg was shaved (using benzine-iodin) and painted with iodin; the wound was cleansed with benzine-iodin; 2 mm. of skin were removed from the edge of the wound; all the exposed subcutaneous fascia was removed; the badly damaged tendons were also excised; a Lane plate was applied; the wound was closed, leaving sufficient space between the sutures for Carrel tubes. The Carrel-Dakin treatment was in-

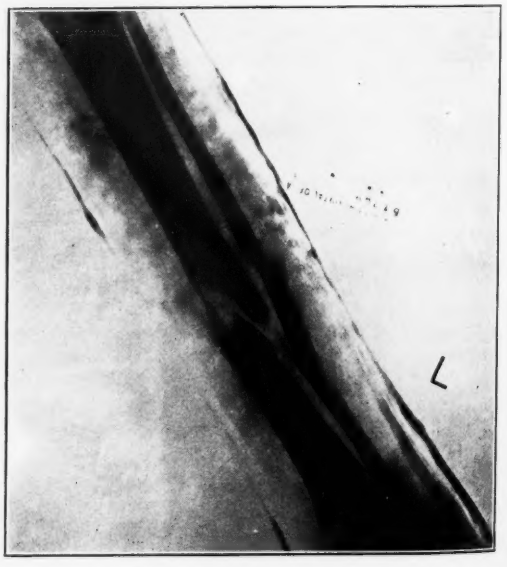


Fig. 3. Case 2

Fig. 4. Case 2

stituted and discontinued in twelve days. The wound healed without suppuration; the plate is still in this patient's leg and gives no trouble four years after the accident. Disability in this case was eight months, and when I last saw him the patient was playing baseball.

If the case is not seen in the first eight or ten hours, we employ traction and suspension. If the fracture of the tibia is high, we employ skin or skeletal traction with suspension; if low, but not near the malleoli, we employ skeletal traction at the malleoli. If it is near the malleoli, we employ traction either above or through the os calcis, using for this purpose a Steinmann pin. If the case comes to us infected with the bones in bad position, whenever possible we adopt this procedure: we drain pus collections and institute the Carrel-Dakin method of treatment; when the temperature has been normal for about one week, or about two weeks, after the preliminary operation, we do an open reduction with internal fixation, if there is likelihood of displacement.

L. B. (*Figs.* 6, 7) came to us with an infected compound fracture of both bones of the forearm. We drained the pus collection, used the Carrel-Dakin method and two weeks later plated both bones and continued the Carrel-Dakin treatments. Of course, the plates subsequently were removed and small fragments of bone were removed, but there is almost no impairment of function and there are no sinuses. This patient returned to work as a pipefitter.

The case of S. R. was similarly treated. Only one bone, the radius, was plated. This case two years after the accident had 100 per cent supination and 75 per cent pronation.

In both of these cases we should probably have had union of the radius with the ulna with great impairment of function if operative measures had not been employed. Internal fixation rather than merely placing the bones in apposition was considered preferable in both cases.

In some cases of compound forearm fractures we prefer traction, as in the case of E. P.:

In this case, traction was maintained by the use of a light weight canvas glove adhered to the hand by the use of Sinclair's glue. The ultimate functional result was good, although the anatomical result is not so good as in the preceding cases.

In fractures of the humerus we find ourselves employing both methods, using suspension and

Fig. 5. Patient W. B.

Fig. 6. Patient L. B.

Fig. 7. Patient L. B.

traction, as in the case of E. P., who was admitted with a gunshot fracture of the upper one-third of the humerus.

A. G., whom we saw within two hours after the accident, had a wound of the soft parts, sufficiently large to permit all operative work.

A revolving emery wheel had broken and several fragments had entered his arm. The wound was washed with benzine-iodin, pieces of emery wheel were removed, the musculo-spiral nerve which had been severed was sutured, a Lane plate was applied to the humerus, and the Carrel-Dakin method of treatment was instituted. Ten days later the bacterial count was less than one to five; the Carrel-Dakin treatment was discontinued and the wound healed without suppuration. Disability in this case was six months. It is now four and one-half years since the accident; the plate is still in place and giving no trouble.

Such a case as this teaches us that plates are not "for temporary use only." If the skin wound can be closed, allowing, of course, sufficient openings for Carrel tubes, there is a probability that these plates will remain in place and give no trouble.

In compound fractures of the femur in young adults, we employ skeletal traction with the Carrel-Dakin treatment of wounds after debridement.

J. A. had an extensive wound under the quadriceps. He was in the hospital two and one-half months, having had to wait about ten days to get his walking calipers, which all fracture cases are instructed to wear until six months after the accident. When he was seen five months after his discharge, there was no shortening and 100 per cent flexion.

In the treatment of cases in the third group, compound fractures in which there is much comminution, we, of course, do not attempt internal fixation, but employ traction from the beginning. In this group we find a type of fracture for which I have heard amputation advised, but for which I would urge conservative treatment.

The case of G. B., (*Figs.* 8, 9) illustrates such a fracture. This patient's temperature was at one time 106°, but he now has a leg which is much more serviceable than an artificial one. He walks with a very slight limp, resulting from an ankylosis of the ankle. This case was treated by suspension and skeletal traction.

E. S. had a similar injury, with considerable wound at the heel as well as just above the malleoli. This case was seen in consultation, and a pin was inserted above the os calcis anterior to the Achilles tendon. Traction was maintained for about four weeks and then a cast applied. He now has union, and the deformity as seen on the plate is not so evident on inspection. The same is true of the preceding case.

In a group of fifty compound fractures which we have examined, five had gas bacillus infections, in two of which amputation was necessary (it is our impression, however, that in our entire group this percentage would not be maintained). Amputation was performed in two other cases: one, a compound fracture of the femur, with gangrene of the leg due to injury of the main vessels of the thigh; the other, a case in which there was considerable loss of bone as well as of soft parts.

No case of tetanus has developed in a compound fracture. All compound fractures should receive a prophylactic injection of antitanic serum and as we find 10 per cent of a group of fifty infected with the gas bacillus, a prophylactic injection of a protective serum should be given. My experience with Bull's serum in the treatment of these cases in France led me to be-

Fig. 8, Patient G. B.

Fig. 9. Patient G. B.

lieve it to be of considerable value. I have had no experience with it as a prophylactic measure, but I believe it should be employed.

There is another complication which annoys us at times, that is, secondary hemorrhage. It is our practice to anesthetize and find the bleeding point rather than to depend upon packs which, as we have stated before, we abhor in compound fractures.

We should summarize our treatment as follows:

(1) In compound fractures with a small skin wound such as that caused by protrusion of the sharp end of a fractured bone, we employ cleansing reduction and external splinting. This may be a temporary splinting with permanent splinting in seven to nine days if the temperature is normal and the wound practically healed.

(2) In compound fractures in which there is a large wound at the skin without comminution and seen within the first eight hours, we employ:

(a) Debridement, being particularly conservative of bone fragments.

(b) Reduction. If difficulty in maintaining reduction is encountered, we employ internal fixation. Otherwise, suspension and traction, either skeletal or skin.

(c) Carrel-Dakin method of treatment, especially when internal fixation with metal plate is employed. In other cases, the wound may be closed by primary suture.

(3) In compound fractures with considerable comminution and in those not seen during the first eight to ten hours, we use:

(a) Debridement, treating the bone conservatively.

(b) Suspension and traction.

(c) Carrel-Dakin method of treatment.

(4) In infected compound fractures with considerable displacement, we employ the Carrel-Dakin method of treatment until the temperature has been normal for one week, and then do an open reduction, employing, if necessary, internal fixation.

In all cases we should give prophylactic injections against tetanus and gas bacilli.

CARDIORRHAPHY

By F. R. SHERARD, M.D., F.A.C.S.,
S. H. STEPHENS, M.D.,
and
J. T. HUTCHENS, M.D.,
Mobile, Ala.

RECOVERY OF CASE

A colored woman, age 27, was admitted to the City Hospital on May 30, 1927, at 11:30 p. m. with a diagnosis of stab wound in the left chest. She was carried to the operating room at 11:45 p. m. about 20 minutes after she received the wound. Her pulse was weak, fast and thready, the patient being in extreme shock. She had an anxious expression, and was bathed in cold, clammy sweat. The heart sounds were distinct and rapid, she was conscious and complained of severe pain in the left chest with slight dyspnea. There was an incised wound in the fifth interspace 2 c.m. to the left of the sternal border.

Under local anesthesia, using 1 per cent novocain solution, the wound was enlarged by an elliptical incision, cutting the cartilage at the sternal junction at the fourth, fifth and sixth ribs, then breaking the ribs at the costo-chondral junction, the pleural cavity was opened and the heart exposed. The pericardial sac was distended and when it was opened three clots of blood the size of a small lemon were removed, also some free blood, in all about 150 c.c. The wound was in the lower third of the right ventricle, in the anterior wall, about 8 mm. in length, longitudinally.

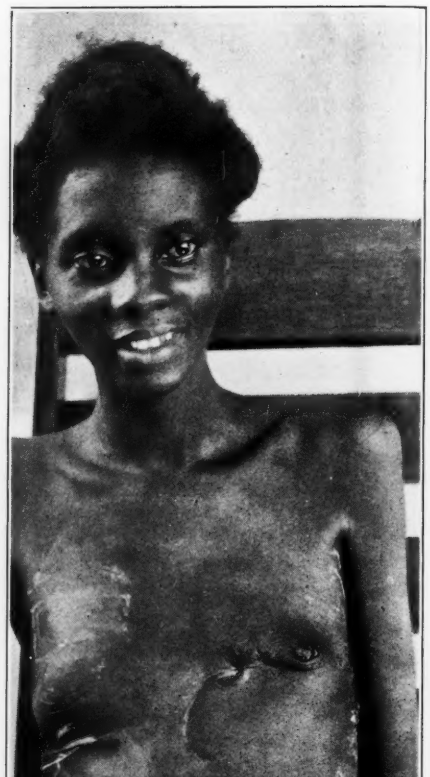
A guy stitch of catgut was placed in the muscular apex of the ventricle, just below the angle of the wound and the heart was pulled to the left by gentle traction made upon the guy stitch by the assistant. Holding the heart in the left hand, four interrupted chromic catgut stitches were inserted in the muscle wall and tied, controlling the hemorrhage from the wound. The pericardial sac was closed by seven chromic catgut, interrupted stitches. A tube gauze drain was inserted in the pleural cavity and the ribs were replaced. The perichondrium was closed with chromic catgut, the skin being closed with silk-worm gut and a rubber tissue drain inserted in the dependent angle of the skin. The wound was dressed.

Progress Notes.—The patient was admitted to the ward, conscious and in poor condition. The pulse was of fair volume, systolic blood pressure being 116, diastolic 90 (left arm), and pulse 130. Her condition remained the same until about the fifth day.

On the fifth post-operative day the maximum temperature was 101.8° F., the minimum 101.2° F. The maximum pulse rate was 142, the minimum 132. Maximum respirations were 38, the minimum 24. The systolic blood pressure in the left arm was 112, diastolic 75.

There was marked flatness over the left lower lobe of the lung; absence of tactile fremitus, decrease of spoken and whispered voice sounds and marked dyspnea. Then 16 oz. of sero-sanguinous fluid were aspirated from the left chest through the tube drain.

On the eighth post-operative day the maximum temperature was 100.2° F.; the minimum 99°. The maximum pulse rate was 128, the minimum 120. The respirations were 32. In the right arm the systolic blood pressure was 106, the diastolic 70. In the left arm the systolic was 102, and diastolic 80.



The total red blood cells were 3,900,000, total white cells 16,750; polymorphonuclears 90 per cent, large lymphocytes 3 per cent, small lymphocytes 7 per cent.

The urine was negative.

Under novocain, 1 per cent solution, an incision was made in the seventh interspace post-axillary line. A rubber tube was fastened in the pleural cavity and the cavity irrigated daily with Dakin's solution.

On the fifteenth post-operative day the temperature ranged from 100.4 to 99.4° F. The pulse was 120 to 118. Respirations were 36. Systolic blood pressure was 105, diastolic 80. A note made by the internist on this day reads as follows: "Heart function and sounds are good. There is less evidence of lung compression this day."

From this day on continued improvement was made, and the patient was discharged from the hospital on her forty-fifth day.

CLINICAL OBSERVATIONS ON THE RELATION OF GASTRIC AND CARDIAC AFFECTIONS*†

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The close relationship of disturbances of the heart to those of the gastro-intestinal tract has long been recognized. It is also well known that certain affections of the heart are accompanied at times with gastro-intestinal symptoms which may become so pronounced that unless an extremely careful examination of the heart be made, an erroneous conclusion may be drawn, the primary condition being entirely overlooked. This is especially true in the incipient stages of certain cardiac lesions at a period prior to the stage when the signs of decompensation are revealed. On the other hand, it is not uncommon to note, that digestive affections may likewise give rise to various cardiac disturbances such as arrhythmia, tachycardia or even pseudo-anginal pains.

The intimate anatomical relation between the heart and the digestive organs will, to a large degree, easily account for many of these manifestations. Due to beginning decompensation of the heart, an early enlargement of the liver is produced as a result of portal stasis, in addition to congestion of the other organs in the abdomen and, in consequence, changes in the gastric secretion and motility occur resulting in the production of dyspeptic symptoms. With the gastric distention thus brought about, the diaphragm is encroached upon, being forced upward, which may occasion additional embarrassment to the heart, further interfering with its function. As a result, a vicious circle is produced which, to a still greater degree, interferes with the digestive functions. An intimate relation between the heart and digestive system is also brought about through the nerve supply. Both organs are supplied by the vagus and sympathetic systems and any disturbance of the heart may be reflected through these paths to the stomach interfering with its motor as well as its secretory functions.

Finally, as a result of the fermentation and absorption of abnormal products from the digestive tract, the heart muscle may become weakened and in consequence, its normal function disturbed. As Broadbent[1] has pointed out, these three elements; pressure from gas, reflex nervous influences, and the result of absorption of toxic substances from the intestinal tract may all act singly or together in producing these abnormalities. He also refers to a remark of his father: "When a patient comes complaining of heart trouble never omit carefully to examine his stomach", to which Lichty[2] adds: "When a patient comes complaining of abdominal trouble never omit to examine his heart".

In the study of the inter-relation of digestive disturbances to those of the heart, a subdivision into the three following groups may be made as a matter of convenience.

(1) Digestive symptoms occurring in heart disease.

(2) Symptoms occurring in relation to the heart due to digestive disorders.

(3) Symptoms produced by combined disease of the heart and digestive organs.

(1) *Digestive Symptoms in Heart Disease.*— During the stage of compensation in valvular heart disease the digestive functions ordinarily remain normal. When decompensation, however, takes place, symptoms directed to the digestive tract are frequently manifested which become more marked as the cardiac dilatation progresses.

According to Fenwick[3] following death from heart disease the stomach appears much thickened, while its inner surface assumes a purplish color and is covered with an excessive secretion of mucus, and there is also present a desquamation of epithelial cells. The rugae of the stomach are increased in size and the mucous membrane presents here and there areas studded with hemorrhages varying greatly in size. Microscopically, an extremely marked congestion of all the veins and capillaries is noted. Due to the pressure produced by the enlarged blood vessels the gastric tubules are compressed and present an irregular appearance while both the central and parietal cells are swollen, their nuclei becoming indistinct with fatty degeneration occurring in the protoplasm.

In mitral stenosis the stomach ordinarily presents enlarged veins in the mucous membrane, and there is frequently a mucous gastritis present, the mucus, at times, being blood stained. The remainder of the digestive tract is congested,

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especially its mucous membrane, and hemorrhagic areas are not uncommon. The liver is frequently markedly enlarged, blood oozing from the surface following incision. The well known nut-meg liver appearance is usually noted. The spleen is somewhat enlarged and presents a deep purplish hue. Its capsule is firm and the entire organ hard. Infarcts are not infrequently observed.

In mitral insufficiency the appearances in the digestive tract are quite similar to those noted in mitral stenosis. Ascites is present and evidences of chronic passive congestion are observed in the liver. The spleen is slightly enlarged, but infarction is far less common than in mitral stenosis. In aortic disease but little of importance is noted in the alimentary tract until failing compensation occurs when the usual symptoms of chronic passive congestion are revealed.

Symptoms.—In cardiac disease in which compensation has been fully established, gastric disturbances are rather rare, though even in these cases we, at times, observe an accumulation of gas in the stomach producing pressure and fullness in the epigastrium, especially following meals in addition to anorexia and eructations. Sudden and excessive distention of the stomach and intestine occasionally occurs, which by pressure upward on the heart adds an additional burden to this organ leading to aggravated forms of dyspnea, vertigo and syncope. In some instances, extreme palpitation occurs following meals, followed by vertigo and arrhythmia.

As the stage of decompensation progresses severe anorexia may develop and, in consequence, the heart is further weakened. Not infrequently nausea and vomiting occur providing further difficulties in nourishing the patient, as well as in the administration of the necessary medication. The vomitus consists of bile stained mucus often containing traces of blood. Rarely hematemesis may occur. If vomiting becomes persistent, acidosis is apt to occur with the odor of acetone to the breath. The abdomen becomes distended and tender on pressure, the liver enlarges and the skin and conjunctivae are jaundiced. In certain instances of cardiac disease associated with general arterio-sclerosis, abdominal pain develops as a prominent feature. It is usually of a paroxysmal type, and may extend over a shorter or longer period of time. This is frequently associated with abdominal tenderness and pulsation, both of which are usually increased on exertion. There is also often present abdominal distention; eructations, pressure and fullness following meals. Similar findings are also frequently observed in cases of myocardial disease. Stockton[4] has called attention to certain dyspeptic symptoms occurring in the beginning dilatation of lumbermen or "luggers" of the Pennsylvania woods. The same symptoms have also been observed in athletes and in robust individuals past middle life, who have undergone unusual physical exertion, in whom distress in the region of the stomach, dizziness and anorexia occur. These symptoms are often markedly increased on exertion. In cardio-vascular disease, attacks of acute cardiospasm are noted frequently associated with intense pain in deglutition and with dysphagia. In angina pectoris, gastric upsets are not infrequent. As a matter of fact, the pain of this disease following upon meals at times associated with distention and eructations may render the diagnosis difficult; and in some instances it may be impossible, unless the patient be held under close and prolonged observation, to determine whether we are actually dealing with a definite anginal affection or a so-called pseudo angina pectoris. In considering angina pectoris, attention must also be directed to those cases in which attacks of such severity occur, as to cause death due to injudicious eating.

Attention must also be directed to a group of cases of coronary thrombosis first described by Herrick[5] in which there is, at times, a close resemblance of the cardiac disturbance to some serious abdominal surgical emergency. In some instances, the condition closely simulates cholelithiasis; at times, the pain of coronary occlusion may be confined to the abdomen although in most instances it is noted in the chest. The pain, however, is usually more constant and does not occur in attacks. Enlargement of the liver and jaundice may occur in both affections and render additional difficulty in diagnosis. At times the electro-cardiogram may assist in the differentiation.

Mallory[6] has recently called attention to a syndrome which he terms splanchnic dyspepsia, which is characterized by a low blood pressure, large mobile pupils, variability in the pulse rate, vasomotor skin disturbances, and sinus arrhythmia, indicating a disturbance of the circulatory system. There are frequently, in addition, other symptoms such as faintness, dizziness, sighing respirations, constipation, gaseous distention and signs of biliousness, and auto-intoxication. These symptoms are markedly relieved by rest, but are increased on exercise. They are also temporarily relieved by laxatives

or enemata, as if the condition were due to an intestinal stasis. This explanation is, however, incorrect inasmuch as relief occurs before evacuation of the bowels has taken place, and the symptoms recur within a few hours before stasis could recur.

Boas[7] is firmly convinced, that heart affections, as well as blood vessel changes play a definite role in the formation and development of peptic ulcer. There have been many observations from a pathological standpoint confirming this view. In many of these cases occurring in individuals past the sixtieth year of life, serious gastric hemorrhages frequently occur. Gastric hemorrhages may also occur in heart affections in which decompensation has taken place, as well as following severe arteriosclerotic changes in the abdominal blood vessels.

Harlow Brooks[8] points to the liver involvement in chronic heart disease which is revealed by an enlargement of the liver with or without jaundice. When, according to Brooks, for any reason the chambers of the right heart are unable to clear themselves of blood at systole, a damming back in the inferior vena cava takes place. The liver capillaries are capable of tremendous distention, and when contraction of the blood channels of the general abdominal viscera takes place the liver acts also as a stopgap taking up much of the surplus blood. This action is vividly observed in cases of acute valve defects and in acute dilatation of the heart from whatever cause. In such conditions the liver may increase markedly in size in a few years. The damming back of the blood necessarily embarrasses liver function, damaging liver cells by compression. In consequence of these changes biliary secretion and excretion is impeded from pressure on the ducts and many microscopic and gross changes are noted in the liver. The symptoms observed are dull pain in the liver region with a sense of weight and pressure, together with indigestion, often increased by fats and sweets, loss of appetite, nausea, vomiting, headaches, jaundice, abdominal distention, dyspnea and edema. According to Brooks, casual examination of the heart may reveal but little or very much. Usually there is a diminished heart rate at first, though finally it becomes rapid. The heart sounds are usually distant and feeble and arrhythmia is usually present.

As the result of functional affections of the heart, gastric disturbances are not uncommon as, for example, those noted in instances of tachycardia and in the arrhythmias. The stomach manifestations are those of gaseous distention which may become marked together with violent eructations. In these cases the relief of the cardiac affection is aided by treatment of the stomach, and the cure is brought about by a careful supervision over the nervous system.

In cardiac disease, the degree of gastric acidity depends largely upon the stage of cardiac failure. In the early stages of decompensation free hydrochloric acid can ordinarily be observed in the gastric contents, but this gradually diminishes as the condition advances. As the acid vanishes, the ferments also begin to disappear, but both may return when compensation has again been established, provided the condition has not been sufficiently prolonged to produce marked anatomical changes in the gastric mucosa. The finding of Heufler[9], that there is an absence of free hydrochloric acid in the largest percentage of cases of cardiac disease associated with valvular lesions has not been borne out by the subsequent experience of Adler and Stern[10] and Einhorn[11]. In 12 patients affected with heart disease, Einhorn found free hydrochloric acid present in eight, while in four it was absent. In 18 cases examined by von Valzah and Nisbet[12] during the period of compensation, no change of gastric secretion was noted. In 23 cases examined during the stage of decompensation normal secretion was observed in five; diminished secretion in 13 and complete absence of hydrochloric in five.

In 25 cases of cardiac disease accompanied by valvular lesions in the stage of compensation, which have been under our care and in which fractional gastric analyses were made, normal acidity was noted in 17 instances; hyperacidity in four; diminished acidity in two and achylia in two. In 25 other cases with definite evidences of decompensation, examined similarly, normal acidity was present in five; hyperacidity in one; diminished acidity in 13 and achylia in six.

In a few instances in which the cases were re-examined after compensation had been restored, the gactric secretion returned entirely to normal when the period of cardiac failure had been of only short duration, while in those instances where it had been prolonged and, especially when it was accompanied by evidences of edema the gastric acidity continued to remain absent.

(2) *Symptoms Occurring in the Heart Due to Digestive Disorders.*—It is well known, that even in health the ingestion of abnormally large meals or indiscretions in diet may increase the

rapidity of the heart beat, and that certain digestive disturbances frequently induce pain around the heart simulating cardiac lesions. On this account, if no definite cause for a disturbance of the heart is noted in the heart itself, one's attention should at once be directed to the digestive tract, disturbances of which not uncommonly produce cardiac symptoms. These appear in the form of tachycardia, arrhythmia, bradycardia and even pseudo-anginal pains. Riegel[13] has pointed to the frequent occurrence of a diminished pulse rate in gastric disease. He presents the history of a female of 19 years affected with chlorosis associated with dyspeptic symptoms of a severe type in which bradycardia was observed for a period of three weeks with a pulse rate of 34 to the minute. The bradycardia was undoubtedly a result of the digestive disturbance, inasmuch as it disappeared entirely with the improvement in this function. In some instances bradycardia may be intermittent, in others continuous and in still others it may occur in paroxysms. At times it appears following immediately upon the ingestion of food, disappearing when the stomach has emptied itself. Bradycardia may be observed in cases of aggravated types of gastric dilatation and should be looked upon in these instances according to Cramer[14] as a sign of inanition.

Occasionally arrhythmia is observed as a result of gastric disorders and it may be greatly intensified by an increase in the digestive symptoms, disappearing with improvement of the condition. Increased gas formation with inability to expel it will frequently account for this symptom.

At times angina-like paroxysms may be observed in susceptible individuals due to overeating. These are not uncommonly of the pseudo-anginal type and may be entirely corrected by the regulation of the diet. They usually occur after a full meal, and are associated with flatulency. True angina pectoris at times cannot be entirely excluded until the angina-like symptoms have completely disappeared following treatment of the dyspepsia.

Palpitation may be directly occasioned by disease of the stomach and bears a close relation to the gastric digestion, being relieved by correction of the digestive disorder. In many instances the expulsion of gas brings about immediate relief. In this condition the stomach is often distended and becomes tympanitic. This undue stretching inhibiting the action of the vagus is thus a potent cause of the cardiac disturbance.

In other instances the palpitation appears in the early morning arousing the patient from sleep; the stomach is markedly distended by gas and relief is afforded by eructations as well as by direct treatment to the digestive disorder. In others, tachycardia occurs during the night, preventing sleep and is not uncommonly associated with dyspnea. It occasions great alarm to the patient and disappears not infrequently spontaneously, or following the administration of nerve sedatives. In this connection attention must be directed to the condition known as acute pneumatosis which is frequently produced by a simultaneous cardio—and pylorospasm, and which is marked by an extreme distention of the stomach. In this affection, which at times assumes a picture of an alarming nature, dyspnea, precordial discomfort and pain, together with a weak, rapid and irregular pulse and cyanosis are frequently noted. Immediate relief is afforded by the expulsion of gas following the introduction of the stomach tube.

Broadbent[15] is of the opinion that certain types of paroxysmal tachycardia are due to gastric distention, which may be overcome by remedies inducing eructations. Nervous palpitation is not infrequently noted as a manifestation of the various functional disorders, and disappears with relief of the primary trouble.

In achylia gastrica as Romheld[16] and Rosenfeld[17] have pointed out, the functional disturbances of the heart which are manifested occur in the form of extra-systoles, bradycardia, tachycardia, as well as pseudo-angina. These conditions disappear very promptly following a careful regulation of the diet, and the administration of muriatic acid. In cardiospasm the patient may complain of dyspnea, fullness and oppression in the chest with irregularity and rapidity of the heart beat and cardiac pains, which are increased on exercise and which rather indicate the presence of some serious cardiac affection, unless an extremely careful examination is made. It not uncommonly occurs in this condition that the patient has so centered his attention upon his heart, that the difficulty in deglutition is entirely overlooked.

According to Flora[18] cardiac symptoms are frequently observed in aerophagia. Those most commonly noted are tender areas in the left submammary and precordial regions, extra-systoles, tachycardia, syncope, pseudo-anginal attacks and acute pneumatosis. It is important to note that true angina pectoris may, however, be complicated with aerophagia, the latter acting as an exciting cause of the attacks.

It is well known that in certain liver affections, especially those accompanied by jaundice, particularly in the early stages, the heart action falls with the production of a lowered pulse rate. In cholelithiasis the acute gall bladder colic may manifest itself at times as pain in the cardiac region occasionally producing symptoms not unlike those observed in angina pectoris. In some of these instances prolonged observation may become necessary in order to clear up the diagnosis.

The influence of digestive disturbances upon the heart should be, therefore, constantly borne in mind, inasmuch as the symptoms produced associated with the heart can only be overcome by proper treatment to the gastro-intestinal tract.

(3) *Symptoms Produced by Combined Disease of the Heart and Digestive Organs.*—In the study of combined disease of both the heart and the digestive organs, it is important to differentiate between those conditions in which the functions of either one are disturbed due to the other and those in which both are affected simultaneously independently of each other. It not uncommonly happens following prolonged disease of the heart or of the digestive organs, that organic changes in both may become so pronounced as to render it difficult at times to determine the seat of the primary affection. Attention has already been directed to the observations of Harlow Brooks[8] relating to the damage produced in the liver due to chronic cardiac disease in which the liver may increase in size most markedly, and in which the casual examination of the heart may reveal but slight changes. In many of these instances not only does the liver present chronic changes, but permanent gastro-intestinal damage of a rather severe type is produced in the form of catarrh. Notwithstanding at least a partial restoration of compensation, the gastro-intestinal tract remains permanently disabled and symptoms such as lack of appetite, abdominal discomfort, nausea and vomiting, alternating constipation and diarrhea, persist. An examination of the gastric contents at this stage will reveal an achylia with considerable mucus and much mucus will also be observed in the stools.

An acute disease of the stomach or a chronic affection may cause decompensation in a heart in which mild muscular disturbance exists, producing serious manifestation of heart failure, or may even cause attacks of angina pectoris in individuals predisposed to this affection.

In nervous individuals gastro-cardiovascular symptoms are not uncommon. In a certain group of these cases often associated with aerophagia, the condition is paroxysmal. The attacks begin and end suddenly lasting a few hours to two or three days. They are mainly observed in the early morning before the patient arises, or they occur during the night and are associated with palpitation, oppression around the heart, fullness and distention in the epigastrium. The patient becomes weak and depressed and dyspnea is marked. The attacks recur at intervals, or the affection may become continuous and chronic. The condition is commonly observed in neurasthenic individuals, the attacks often recurring following the ingestion of indigestible food. During the intervals between the attacks the circulation and heart are normal. The cardiovascular paroxysms may be controlled by proper treatment to the nervous and the digestive systems.

In a further group, also occurring in neurasthenic patients, especially in chlorotic females, the symptoms are produced by the ingestion of indigestible food and begin with attacks of slight dyspnea and substernal oppression. A gallop rhythm may develop and the attack is frequently accompanied with pain extending into the thorax and the abdomen. It may be of varying degree of severity and frequently ends abruptly. The heart at no time presents evidence of organic disease.

Attention must be directed to the visceral arteriosclerosis occurring during middle life and old age associated with the digestive tract and heart which has, according to our experience, not been accorded sufficient importance. This condition occurs much more frequently than is usually acknowledged. Of 500 cases of gastric disorder of middle life studied by us[19], arteriosclerosis appeared in 33 instances, (6.6 per cent) about twice as frequently in males as in females; and of our 300 cases of gastrict disorders of old age it appeared in 17 instances (5.6 per cent) again almost twice as frequently in males as in females. Arteriosclerosis leading to gastric disturbances associated with cardiac disease may be observed in one of two distinct types.

(1) Those instances in which the arteriosclerotic changes are most marked in the stomach and heart.

(2) Those in which the manifestations are secondary to a general arteriosclerosis. The main clinical gastric manifestations recognized in middle life and old age as the result of cardiosclerosis and of arteriosclerosis of the abdominal arteries may be divided into three groups.

(1) The dyspeptic and cardiac symptoms due to general arteriosclerosis.

(2) Abdominal angina.

(3) Gastric ulcer with or without hemorrhage.

(1) *Dyspeptic and Cardiac Symptoms Due to General Arteriosclerosis.*—These symptoms usually begin insidiously and are principally manifested in the form of flatulency, fullness, distention, nausea, eructations, dizziness, palpitation and shortness of breath. At first but a few of these symptoms are noted, and then only on awakening in the morning, and they are often relieved by eructations of gas. The appetite for breakfast gradually diminishes and the patient finally is unable to eat until the noon meal. While the noon meal may be taken with relish, the symptoms above noted are apt to return in the afternoon and epigastric distress is not uncommon. As time goes on, the general abdominal distention, distress, and eructations are constantly at hand. Nausea and retching after meals are not infrequent, but vomiting is rarely noted. Tachycardia, dyspnea, and tightness of the chest are not uncommon adding further to the distress of the patient. The flatulency, at times, increases in severity, especially at night and the patient is forced to sit up in bed in great discomfort making efforts to eructate and often suffering with marked dyspnea. The night attacks are frequently increased by the evening meal and, on this account, the patient frequently places himself upon a liquid or semi-solid diet. The symptoms just noted may exist with varying degrees of intensity for years and may even disappear for a short period of time to return often with great severity. At this period, however, the dyspnea, flatulency and epigastric distress appear on slight exertion, even without relation to food. Intestinal flatulency and distress now manifest themselves and the patient loses weight and strength, the symptoms progress and the patient may die either from an intercurrent cerebral, cardiac or renal complication or from exhaustion.

(2) *Abdominal Angina.*—Abdominal angina occurs frequently as the result of an abdominal endarteritis. These changes of an inflammatory or degenerative character take their onset slowly in the abdominal aorta and its branches, are progressive, and are the cause of ill-defined, though often severe, abdominal pain. This pain is usually paroxysmal in character, is often increased on exercise, is relieved by rest, and is associated with tenderness on pressure along the aortic plexus and with lancinating pains extending along the course of the iliac and femoral vessels.

Harlow Brooks has called attention to the fact that the disturbed visceral function often associated with pain and elevation of blood pressure which cannot otherwise be accounted for, is frequently the cause of some localized area of abdominal arterial disease.

The pain caused by arteriosclerotic changes in the abdominal aorta may be observed in the epigastrium, thorax or lower abdomen. Like angina pectoris, it is ordinarily increased on exertion or excitement, and is accompanied with tachycardia and hypertension. The pain is often transmitted into the dorsal and lumbar regions of the spine and disappears under the influence of rest and the administration of the nitrites. According to Allen Jones:

> "It may be termed abdominal claudification and is accompanied by a consciousness of heavy hammering intra-abdominal pulsation, which rivets the patient's attention, is somewhat alarming and prompts him to seek immediate physical and mental relaxation".

When the gastric branch is involved in this condition, epigastric pain often of a very severe type is induced by a full meal which is not entirely relieved until the stomach has entirely emptied itself; light meals produce but moderate discomfort.

(3) *Gastric Ulcer, With or Without Hemorrhage.*—The character of the formation of these ulcerations is of importance. They are definitely due to degenerative changes as a result of marked ischemia of certain parts of the gastric wall caused by an arteriosclerosis (often a thromboangiitis of a branch of the gastric artery). A frequent cause of the hemorrhages is found in the rupture of the miliary aneurysms in the small gastric arterioles.

When, in individuals in advanced years with evident manifestations of cardiosclerosis, the usual signs of ulcerations occur, one should always suspect the presence of this affection. On the other hand, inasmuch as carcinoma may have its onset in a similar manner, the diagnosis may become more complicated.

When hemorrhage occurs with this form of ulceration the diagnosis becomes much less difficult, though as has already been noted, hemorrhages do occur even of a massive type as a result of the rupture of the arteriosclerotic vessels in the stomach. Cases of this character

have been reported by Simon[21] and similar observations have been noted by us[22].

In order to arrive at a correct diagnosis of this affection, a thorough physical examination of the patient should be made and not too much reliance should be placed upon the mere symptoms of indigestion.

In a patient of middle age or advanced years complaining of flatulency, distention, and with epigastric pains and dyspnea which are relieved by eructations, especially when these symptoms are aggravated at night, a careful examination into the cardiovascular system should be made. Not infrequently one will find marked hypertension with an enlarged heart, with an accentuated second aortic sound or a murmur over the aorta, pulsation in the episternal notch, discomfort on pressure along the abdominal aorta, together with an increase in the urine which is of low specific gravity and contains albumin and casts. These findings point directly to the arteriosclerotic changes as causative factors in the production of the gastric affection.

Finally, attention must be directed to the group of cases in which two entirely distinct affections, one associated with the heart and the other with the digestive tract, may occur independently of each other. Thus a cardiac lesion may have existed for a long period of time and decompensation finally occurs. In some of these instances the sudden development of a lesion in the digestive tract such as, for example, carcinoma may render the diagnosis extremely difficult. It may be quite impossible, at first, to determine whether we are dealing with a secondary digestive disturbance brought about by a failing heart, or whether the symptoms point rather to a beginning carcinoma of the digestive tract.

A similar problem presents itself in patients with digestive symptoms such as are observed in gallstone colic in which angina attacks likewise occur. In both of these groups great difficulty in diagnosis is presented and, at times, the more serious affection may be entirely overlooked. Verbrycke[23] has reported 23 cases in which cardiospasm was associated with aneurysm, aortitis and angina pectoris and in which there existed a combination of both gastric and cardiovascular disease. It is quite possible that in these cases the cardiospasm may have been produced reflexly, and not unlikely that both affections may have occurred as a result of focal infection causing disease of the heart muscle, coronary and other vessels on the one hand as well as the cardiospasm on the other.

SUMMARY

Attention is directed to the intimate relationship between disturbances of the heart and of the gastro-intestinal tract. This is accounted for partly by the close anatomical relation between the digestive organs and by their nerve supply. An attempt is made to show, that in cardiac diseases in which compensation is still established, gastro-intestinal disturbances are infrequently noted, while in the stage of decompensation severe gastro-intestinal symptoms are extremely apt to develop. In a certain group of cases, a close resemblance of the cardiac disturbance to some serious abdominal surgical emergency may even occur.

The symptoms noted in connection with the heart due to digestive disorders are likewise not uncommon, and this relation should constantly be borne in mind, inasmuch as relief can be afforded only in these instances by direct treatment to the gastro-intestinal tract. There still remains another group of symptoms produced by combined disease of the heart and digestive organs. It is not uncommon, following prolonged disease of the heart or of the digestive organs, that organic changes in both may become so pronounced as to render it difficult, at times, to determine the seat of the primary affection. Attention must be especially directed to the arteriosclerosis occurring during middle life and old age, both in the digestive tract and heart, which has not been accorded sufficient importance.

Finally, there still remains a group of cases, in which two entirely distinct affections, one associated with the heart and the other with the digestive tract, may occur independently of each other, and yet it may be quite impossible at first to determine whether we are dealing with a secondary digestive disturbance brought about by a failing heart, or whether a primary disease of the digestive tract has developed in addition to the heart affection.

In the study of cardiac and digestive affections, it is, therefore, of importance to bear in mind the reciprocal relation of these organs to one another in order to prevent serious errors in diagnosis.

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RELATION OF PIGMENT CONTENT IN SERUM AND SPINAL FLUID OF NEWBORN INFANTS*†

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No phase of medical research adds a more fascinating chapter to our knowledge of the physiology of the human organism than do the modern contributions made in the effort to establish the nature and origin, and ultimate disposition of the cerebrospinal fluid. Much has been accomplished since Faivre first in 1853 suggested that the choroid plexus was the probable origin of the spinal fluid, but not until 1919 did Dandy definitely prove this structure to be the sole source of the fluid.

To follow the various ramifications of this research work, which step by step has broadened our fund of information on the subject, is beyond the scope of this paper. However, certain of the salient features which appear to have some bearing on what is to follow will be touched upon.

The mechanism by which the fluid is formed by the choroid plexus has been the center of much controversy and experimentation. The theory of the glandular or secretory mechanism rested chiefly on a histological basis evidenced by significant cellular changes which take place when certain substances, such as ether, which increase cerebrospinal fluid flow are administered. Later investigation threw doubt on this assumption, and as early as 1912 Mestrezat advanced the theory that the fluid was not a secretion but a dialysate and that the cells covering the choroid plexus act simply as a colloid membrane. However, he noted that many substances foreign to blood plasma, even though of small molecule, do not pass through the choroid plexus. Many facts seem to support such a view, among which may be mentioned: first, the spinal fluid pressure is always lower than that of the intracranial capillaries; further, under normal conditions its composition is fairly constant, it contains no substance not found in the blood plasma, and if in pathological conditions certain substances, such as urea or glucose, are increased in the blood plasma, there is a corresponding increase in the spinal fluid. Such organic substances as alcohol, ether and chloroform pass readily into the fluid; on the other hand, colloidal substances are almost completely excluded. These and other facts have finally established firmly the theory that the fluid is a dialysate and not a secretion.

It is difficult, however, to explain why certain substances pass the barrier with facility, whereas others are excluded. In artificial jaundice or after injecting bile intravenously bile salts have been found in the cerebrospinal fluid, but bile pigment was absent. Concerning the passage of this latter substance, Cushing makes the following statement:

> "The bile pigments themselves do not normally pass the barrier of the choroid plexus, but are only found in the fluid in small traces in long-standing cases of deep jaundice, and perhaps only then because of functional damage to the choroidal epithelium."

The foregoing facts, for which I am indebted in the main to Greenfield and Carmichael in their excellent little book on "Cerebrospinal Fluid in Clinical Diagnosis," coupled with certain observations of my own, have prompted the studies the results of which I wish to report.

During the past four years on the Newborn Service of the Grady Hospital, Emory Division, I have examined the spinal fluids of approximately 900 newborn negro infants. These observations have been concerned chiefly with the study of intracranial hemorrhage and the effects of congenital lues on the character of the spinal fluid. As reported two years ago, early in these studies I was impressed with the constant presence of a pigment varying in intensity from a pale straw to that of a deep greenish-yellow color. Such an observation seemed to have unusual significance since it apparently was not

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CHART I
THE ICTERUS INDEX ON THE BLOOD AND SPINAL FLUID OF NEWBORN INFANTS AT VARIOUS AGES

Age, Hours	Blood Serum		Spinal Fluid		Ratio Pigment Concentration
	Number	Av. Index	Number	Av. Index	
24	25	40.6	21	0.33	121 to 1
48	24	53.6	22	0.40	132 to 1
72	29	78.5	26	0.69	110 to 1
96	28	77.6	31	0.70	110 to 1
120	18	79.7	17	0.57	139 to 1
144	10	63.3	9	0.50	126 to 1
168	4	31.2	4	0.22	138 to 1
192	1	6.0	1	0. 1	*

*Greater than 60 to 1.
Spinal fluids showing hemorrhage not included.

in accord with the accepted views regarding the passage of pigments from blood to spinal fluid.

The existence of a high bilirubin content in the serum of all newborn infants is a well-established fact and one would suppose that very probably the pigment in the spinal fluid was of a similar nature. Commoner tests for bilirubin on both serum and spinal fluid proved negative, but by means of the van den Bergh reaction it was possible to identify these substances. All of the sera examined and many of the deeper spinal fluids gave a positive indirect van den Bergh reaction, the paler fluids failing to give the test evidently on account of the extremely small amount of pigment present. According to van den Bergh, McNee and others such a reaction indicates the existence of a protein-bound bilirubin in the serum, which if present in sufficient quantities to appear in the skin is termed an hemolytic jaundice, in contradistinction to the simple unbound bilirubin which appears in the blood and skin resulting from some obstruction of the hepatic ducts.

It was decided if possible to measure quantitatively the pigment in both serum and spinal fluid and to determine what relation, if any, exists between the two. The icterus index offered a simple though rough means of arriving at this figure for the serum, and it seemed probable that the test might be adapted also for the estimation of pigment in the spinal fluid. Since the amount of pigment in the fluid is often minute, a quantitative chemical estimate seemed impractical and for this reason the more exact van den Bergh quantitative reaction was discarded for Neulengracht's method which, though probably more crude in its estimation, has presented definite data for comparison.

The icterus index of the blood serum is commonly determined today simply by comparing the intensity of pigment present in the serum with various dilutions of potassium bichromate, which substance imparts essentially the same tint to a solution as does bilirubin. Arbitrarily the intensity of color obtained when 10 mg. of potassium bichromate is dissolved in 100 c. c. of water has been designated as having an icterus index of one. With this concentration as a basis, varying dilutions up to 2 gm. in 100 c. c. or the equivalent of an icterus index of 200 are prepared as standards with which the blood serum may be compared.

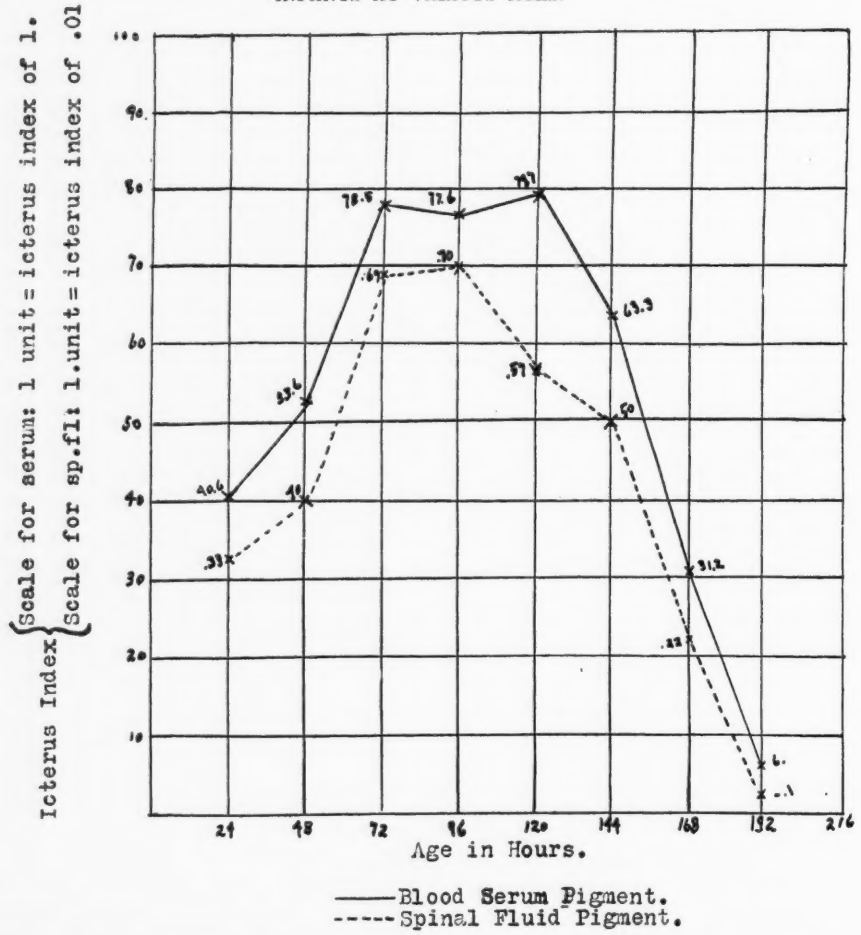
Since the concentration of pigment in the spinal fluid of the newborn is far below that of the serum, it was naturally found necessary to prepare an entirely separate set of standards for the estimation of pigment in this fluid. Consequently with the same standard for the icterus index of one, solutions were made varying in concentration from that of an icterus index of 0.9 down to that of 0.1, which latter exhibited only the faintest yellow tint.

With the definite limitations of this method as one of precision in determining pigment concentrations well in mind, but with the equal assurance that as a mode of comparison it had merit, the estimations on both serum and spinal fluid were made. A total of 152 newborn infants comprise the series on which this work is based. It so happens that the large majority of these infants were born of syphilitic mothers, since this study was carried out coincidentally with some observations on the spinal fluid and blood of these infants suspected of the syphilitic infection. As has been formerly shown, however, syphilis seems to play no important role in pigment metabolism of the fluids and tissue of the newborn. Furthermore, due to the intensive prenatal treatment of the mothers, these babies, for the most part, were clinically and serologically free of syphilis at birth. No attempt, therefore, will be made at this time to discuss the Wassermann reaction in this series or its influence on the question in hand.

As it is well known that the bilirubin concentration of the blood of newborn infants varies from day to day, no attempt to average the readings of the entire series has been made. The results are grouped according to the age of the infant at the time the blood was drawn, and from these averages were obtained. Chart 1 shows clearly the gradual rise of the icterus index to its high level on the third, fourth, and fifth days, following which there is a gradual

CHART NO. 2

THE ICTERUS INDEX ON THE BLOOD SERUM AND SPINAL FLUID OF NEWBORN INFANTS AT VARIOUS AGES.



decline until normal is reached at the end of the eighth day. The curve shows this in a more graphic manner and also shows the relation of the spinal fluid icterus index to that of the serum, which will be discussed more in detail later.

Charts 1 and 2 show in a striking manner the relation of pigment concentration in the spinal fluid to that of the serum. It will be noted that the concentration in the fluid increases in approximately the same ratio as that of the serum until the high level is reached, after which there is a gradual fall to the normal. The curves show this relation graphically, and though there are slight variations in their contour, certainly the general trend is identical and very probably with a larger number of cases even those minor differences would disappear. These figures show conclusively that the pigment concentration in spinal fluid varies directly with that in the blood plasma and therefore adds another link in the chain of evidence against the secretory function of the choroid plexus and in favor of the mechanism of simple osmosis. In studying the relation of the curves it must be kept in mind that the actual relative values are not expressed by the graph, for whereas the serum icterus index is plotted to a

CHART III

THE ICTERUS INDEX ON BLOOD SERUM AND SPINAL FLUID OF NEWBORN INFANTS SHOWING INTRACRANIAL HEMORRHAGE

Case No.	Age, Hours	Serum	Spinal Fluid	Ratio Pigment Content
1	24	20	0.6	33 to 1
2	24	35	0.5	70 to 1
3	24	30	0.6	50 to 1
4	24	40	1.8	22 to 1
5	24	15	0.5	30 to 1
6	24	30	0.9	33 to 1
7	24	85	4.0	21 to 1
8	48	15	1.0	15 to 1
9	72	100	1.5	66 to 1
10	72	200	6.0	33 to 1
11	72	40	1.5	27 to 1
12	96	60	1.3	46 to 1
13	144	40	1.8	22 to 1

scale in which one unit is equivalent to an icterus index of one, the spinal fluid index is plotted to a scale in which one unit is equivalent to 0.01 of an icterus index of one. The curves, therefore, serve to show only the relative trend of the pigment variations and in no way express their true values.

To obtain some idea of an actual quantitative ratio between the pigment in serum and spinal fluid, the average icterus index obtained on the serum for each twenty-four hour period was divided by the figure representing the average icterus index on the spinal fluid for the same period. A study of these figures as shown in Chart 1 reveals that this ratio varies from 110 parts of pigment in the serum to 1 part in the spinal fluid, to 139 parts in the serum to 1 part in the fluid, with an average of 125 to 1. Assuming the passage of pigment from blood serum to spinal fluid to be accomplished by means of osmosis, it would seem that the relative concentrations for each twenty-four hour period should be the same, and such is probably the case. The discrepancies shown in the figures of this series are probably due to the relatively crude quantitative estimation, especially in the higher concentrations in the serums where matching with the standards is more difficult.

In Chart 3 are grouped the cases in which the spinal fluid showed evidence of intracranial hemorrhage. The ratio of pigment concentration in the serum to that in spinal fluid is in striking contrast to the ratio obtained in the normal serums and fluids. Whereas, in the latter group the average ratio is 125 to 1, in this group the average ratio is only 36 to 1, a relatively tremendous preponderance of pigment in the spinal fluid as compared to that in the serum. These figures show quite conclusively the pigment forming property of the meninges on the introduction of blood, and add another link in the chain of evidence in favor of extrahepatic bilirubin formation, for these fluids give a positive indirect van den Bergh reaction.

Prior to the studies made in the past four years on the spinal fluid of newborn infants it was felt that the presence of a fluid showing xanthochromia indicated the existence of intracranial hemorrhage. However, since it has been shown that xanthochromia is a physiological process which may at times be present to an intensive degree, such assumption seemed without foundation. Every yellow spinal fluid does not denote intracranial hemorrhage. However, a study of the relative concentration of pigment in serum and spinal fluid seems to offer a fairly simple method of distinguishing the physiological xanthochromia from that due to local pigment formation resulting from intracranial hemorrhage. A careful study of the figures representing the relative concentration of pigment in serum and spinal fluid of normal newborn infants as contrasted to those for infants suffering with intracranial hemorrhage seems to justify the following assertion: that an infant whose pigment concentration in blood serum is less than seventy-five times greater than that of the pigment concentration of the spinal fluid, has probably suffered from intracranial hemorrhage. It is very probable that this figure might be placed even higher, since no group of normal cases showed a serum pigment concentration less than 110 to 1 as compared with the spinal fluid.

The presence of bilirubin in the spinal fluid of adults is extremely rare and this substance evidently passes over with greatest difficulty, and only after the concentration in the blood plasma has reached a very high figure. Therefore, it is quite apparent from these studies that certain factors concerned in the passage of this substance from the blood to the spinal fluid in the newborn are fundamentally different from those in the adult. Two possible explanations suggest themselves, namely: an essential difference in choroid plexus structure which increases the permeability of this tissue to certain substances in the newborn; or, second, the type of bilirubin molecule found in the serum and spinal fluid of the newborn is such that it readily passes the choroid plexus barrier. Though I am unable to state which of these theories is correct,

I am inclined to believe, with the meager data at hand, that the answer lies in the structure of the molecule rather than in any fundamental histological or physiological difference in plexus structure or behavior. This conjecture is based on the type of van den Bergh reaction which is obtained from serum and spinal fluid.

Though I appreciate the fact that the reliability of the van den Bergh reaction as a means of differentiating the types of jaundice is in dispute, still certainly there must be some definite difference in the chemical structure of two substances one of which gives the direct van den Bergh and the other the indirect, regardless of whether one may be indicative of the obstructive type and the other the hemolytic type of jaundice.

It is probable that observations upon which the statement of the impermeability of the choroid plexus to bile pigment are based have been made on the obstructive type of jaundice only, which, as a rule, gives the direct van den Bergh reaction. So far as I know, no studies of spinal fluid have been made on adults suffering with the so-called hemolytic jaundice. Should such studies prove the presence of a pigment it would indicate conclusively that the explanation of the findings here reported is to be found in the type of bilirubin molecule.

SUMMARY

(1) The spinal fluid and blood serum of 152 newborn negro infants born of syphilitic parents has been studied to determine pigment content.

(2) The van den Bergh test for bilirubin gave a positive indirect reaction on all serums and many of the deeper spinal fluids.

(3) The pigment content of the spinal fluid as measured by the icterus index varies directly with that of the serum and is approximately 1/125 as great in amount.

(4) The concentration of pigment in both serum and spinal fluid shows a gradual rise to the third, fourth and fifth days, following which there is a gradual decline to normal by approximately the eighth day.

(5) Thirteen cases of intracranial hemorrhage were studied. The average pigment concentration in the serum was found to be only thirty times as great as that in the spinal fluid, a marked relative preponderance in the latter.

CONCLUSIONS

Serum and spinal fluid of newborn infants contain protein-bound bilirubin as shown by the positive indirect van den Bergh reaction.

The normal pigment concentration ratio of the serum to the spinal fluid is greater than 100 to 1. A sero-spinal fluid pigment ratio which is less than 75 to 1 indicates the presence of blood in the spinal fluid at some time, showing in a striking manner the local bilirubin formation in the spinal fluid.

These studies seem to strengthen the theory of osmosis as the process by which substances pass from serum to spinal fluid through the choroid plexus.

A STUDY OF HEART DISEASE IN THE NEGRO RACE*

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The gradual and persistent increase in the death rate from heart disease and the preponderance of heart disease in the negro race as compared with the white race has been stressed by Dublin,[1] Woody,[2] Albert,[3] Wood, Jones, and Kimbrough,[4] Wyckoff and Lingg,[5] Stone and Vanzant,[6] and others. Through the Research Committee of the American Heart Association, an intensive study is being made of the incidence, etiology, and prevention of heart disease. The morbidity and mortality of heart disease and the etiological agents concerned in different races and localities are such that any series of carefully studied cases occurring in various parts of the country will be of value in helping solve this problem.

With this idea in mind, a selected series of patients admitted to the medical wards of Emory University Division of Grady Hospital from January 1, 1926, to September 15, 1927, has been tabulated and studied as to incidence, etiology, duration, and mortality. With few exceptions, all of the patients have had a careful history, physical examination, complete blood examination, Wassermann, blood chemical studies, urinalysis, concentration tests, phenolphthalein excretions, teleogram and vital capacity studies. In those patients remaining for a sufficient length of time, these observations were repeated at frequent intervals. Only in selected cases have electrocardiographic studies been made.

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TABLE I—A CLASSIFICATION BY DECADES AND SEX OF 257 CARDIAC CASES OF WHICH 164 OR 63.8 PER CENT ARE MALES AND 93 OR 36.1 PER CENT ARE FEMALES

Decades	1	2	3	4	5	6	7	8	9	10
Male	5	6	11	27	48	40	18	7	1	1
Female	5	6	14	12	29	15	9	2	1	0
No. Patients	10	12	25	39	77	55	27	9	2	1
Percentage	3.9	4.6	9.7	15.2	30.0	21.4	10.5	3.5	0.8	0.4

Incidence.—This series consists of 257 patients, representing 277 admissions. During this same period of time there were 7500 general admissions, of which 3.7 per cent were due to heart disease. The admissions to the male and female medical wards during this period totalled 1222 cases. Of this number, 265, or 21.7 per cent, were due to heart disease. Admissions to the male medical ward were 683. Of this number, 175, or 24.9 per cent, were due to heart disease. Admissions to the female medical ward were 539. Of this number, 95, or 17.6 per cent of the admissions, were due to heart disease. Of the 277 cardiac admissions, ten were admitted to the pediatric service. On this service during the period of study there were 462 medical admissions. The ten cases represent 2.1 per cent of the admissions on this service.

Table 1 is a classification by decades and by sex of 257 patients with heart disease. Of this number, 77, or 30 per cent, by far the largest percentage, occurred in the fifth decade, and a total of 171, or 66.6 per cent of the entire series, occurred in the fourth, fifth and sixth decades. Stone and Vanzant[6] have also noted that the greatest incidence of cardiac disease in the negro race is to be found in the fifth decade, while on the other hand these same authors have noticed that in the white race the incidence is greatest in the sixth decade. It will be noted from the groups presented that the incidence of heart disease by decades is about the same in both the male and female groups.

Table 2 shows the etiological diagnosis occurring in this group of cases divided according to sex and percentage. The total of all of the rheumatic groups numbered eighteen cases, or 7.1 per cent. Wood, Jones, and Kimbrough,[4] in studying two series of cardiac cases, one group occurring in Virginia and the other in Massachusetts, found in Virginia an average of 11.6 per cent of rheumatic heart disease among the negro cases, 28 per cent among the white cases, and in Massachusetts 39.8 per cent in the total of the series studied in that state. It is a well known fact that rheumatic heart disease is much more prevalent in the North than in the South. The average number of patients suffering with rheumatic heart disease in the North is approximately 39 to 40 per cent, whereas the cases in the South are much fewer in number.

The largest group of cases in our series is associated etiologically with arteriosclerosis and hypertension, and numbers 71, or 276 per cent. However, if we group all cases with arteriosclerosis, hypertension, and its various complications, we have a total of 157 cases, or 61 per cent of the entire series.

TABLE II

DIAGNOSES	SEX		Patients	Per Cent
	Male	Female		
Rheumatic heart disease mitral lesion	4	7	11	4.3
Rheumatic heart disease mitral and aortic lesions	2	1	3	1.2
Rheumatic heart disease plus complications	1	3	4	1.6
Subacute bacterial endocarditis	2	1	3	1.2
Arteriosclerosis	10	4	14	5.4
Arteriosclerosis plus complications	2	2	4	1.5
Coronary occlusion	1	0	1	0.4
Hypertensive heart disease	7	9	16	6.2
Hypertensive heart disease plus complications	3	7	10	3.9
Arteriosclerosis plus hypertension	49	22	71	27.6
Arteriosclerosis plus hypertension plus complications	24	18	42	16.3
Syphilitic heart disease (aortic insufficiency)	30	6	36	14.00
Syphilitic heart disease (aortitis and aneurysm)	6	0	6	2.3
Syphilitic heart disease plus complications	13	4	17	6.6
Syphilitic plus complications plus arteriosclerosis plus complications	4	2	6	2.3
Congenital heart disease	1	1	2	0.78
Unclassified	5	6	11	4.2
Total	164	93	257	

Wood, Jones, and Kimbrough[4] found hypertension, arteriosclerosis, and their complications occurring in 60 cases, or 53.5 per cent of the negroes in Virginia, the percentage of males and females being about equally divided. Stone and Vanzant of Galveston[6], in a careful study of 420 cases, classified in this group 60.1 per cent of the cases, a percentage which is exactly the same as ours.

The syphilitic group is extremely important. We have a total of 65, or 24.2 per cent, whose disability can be traced directly to syphilitic infection. In this group 53, or 81.5 per cent occurred among the males, and twelve, or 18.5 per cent, among females. Of the 53 males in the syphilitic group, eleven showed evidence of arteriosclerosis, and fourteen, of hypertension. Of the twelve females in the syphilitic group, only one had a definite arteriosclerosis and two had hypertension. All gave definite evidences of syphilitic cardiovascular lesions and had either positive Wassermanns or positive histories of previous syphilitic infections. In addition to these cases, fourteen others were observed in this series who had positive Wassermanns without definite evidence of syphilis of the heart or vessels. Therefore, in this series of 257 cases of cardiac disease, 79, or 29.7 per cent, were definitely syphilitic. It is extremely difficult to determine accurately, even by statistical studies, the percentage of cases with syphilitic infection that eventually have some form of cardiovascular disease. In a careful study of 50 cases of early syphilis in the negro race occurring in the Grady Hospital during a five-year period, Paullin, Davison, and Wood[8] found definite syphilitic involvement of the cardiovascular system in 176, or 26.4 per cent. In this same study, 660 cases of cardiac disease were etiologically classified, with the result that 26.6 per cent were included in the group of syphilitic cardiovascular disease.

In other words, it would seem that from 20 to 25 per cent of negroes who contract syphilis sooner or later develop some evidence of cardiovascular syphilis. The percentage of syphilitic infection in this present study, as compared with the study previously published by Paullin, Davison, and Wood[8], is slightly smaller than that which occurred during the five-year period. It is to be hoped that the diminution in the percentage of syphilitic heart disease, though small, is due to better and more thorough early treatment.

Among the cases of syphilitic heart disease, 36, or 55.4 per cent, had aortic regurgitant murmurs, and of this number, 30, or 83.3 per cent, were males. Wood, Jones, and Kimbrough[4], in an analysis of 59 cases of aortic regurgitation in the white and negro races, found 59.3 per cent of syphilitic origin. It is observed, therefore, that syphilitic heart disease occurs much more commonly in the negro male than in the negro female, and that the lesion which causes the greatest amount of disability is aortic regurgitation. There were seven cases of aneurysm of the aorta, occurring in a great majority of instances in the fifth decade, and all in males.

TABLE III

		Percentage
Number cases with definite evidence of syphilitic heart disease	65	25.3
Number cases of syphilitic heart disease with positive Wassermanns	51	78.4
Number cases of syphilitic heart disease with positive history of syphilis with negative Wassermanns	14	5.4

Table III.—Table III shows the results of the Wassermann reaction among the cases of syphilitic heart disease.

TABLE IV—SYPHILITIC HEART DISEASE WASSERMANNS

Total number of cases	225
Number positive Wassermanns	57
Percentage positive Wassermanns	25.3
Total number males studied	140
Number positive Wassermanns males	41
Percentage positive Wassermanns males	29.3
Total number females studied	85
Number positive Wassermanns females	16
Percentage positive Wassermanns females	18.8

Table IV.—Table IV shows the result of a study of the Wassermann reaction in a total of 225 cases. Due to the shortness of stay of some cases in the hospital, or to a mishap, only 225 of the 257 cases had Wassermann reactions. Of the entire series, 25.3 per cent were positive, and it is interesting to know that the males had positive reactions in 29.3 per cent, whereas the females gave positive results only in 18.8 per cent, again showing rather conclusively that syphilis is more prevalent in the negro male than in the negro female.

Only one case of typical paroxysmal pain or angina pectoris occurred. This was in a female in the seventh decade having arteriosclerosis. There was a history of syphilitic infection and the Wassermann reaction was positive, but no further evidence of syphilitic heart disease could be found. White and Wood[9] have given an excellent discussion and classification of heart pain, with a differentiation of angina from aortic pain and other vascular types. Among the group

TABLE V

	Duration of Symptoms			Days in Hosp.			No. Adm.		
	Shortest	Longest	Average	Shortest	Longest	Average	Smallest	Greatest	Average
Rheumatic heart disease	7 da.	4 yr.	15 mo.	5	66	41	1	6	2.0
Rheumatic heart disease plus complications	4 mo.	3 yr.	17 mo.	11	120	42	1	3	2.0
Subacute bacterial endocarditis	3 mo	18 mo.	10 mo.	7	97	49	1	1	1.0
Arteriosclerosis	6 wk.	5 yr.	20 mo.	1	120	27 da.	1	5	1.9
Arteriosclerosis plus complications	4 da.	9 mo.	4 mo.	9	32	23 da.	1	4	1.8
Coronary occlusion				1 da.		1 da.	1	1	1.0
Hypertensive heart disease	21 da.	12 yr.	2 yr.	1 hr.	66	19 da.	1	2	1.4
Hypertensive heart disease plus complications	1 da.	5 yr.	3 yr.	1	81	32 da.	1	5	1.6
Arteriosclerosis plus hypertension	1 mo.	20 yr.	3 yr.	1	148	29 da.	1	5	1.6
Arteriosclerosis plus hypertension plus complications	1 da.	10 yr.	2 yr.	1 da.	63	25 da.	1	5	1.3
Syphilitic heart disease (aortic insufficiency)	3 da.	5 yr.	15 mo.	1	90	24	1	4	1.7
Syphilitic heart disease (aortitis and aneurysm)	2 mo.	1 yr.	6 mo.	4	36	21	1	2	1.2
Syphilitic heart disease plus complications	1 da.	3 yr.	6 mo.	2	90	32	1	2	1.1
Syphilitic plus complications plus arterioscl. plus complications	1 mo.	5 yr.	9 mo.	1	90	27	1	4	1.9
Congenital heart disease	15 yr.	27 yr.	21 yr.	7	32	20	1	1	1.0
Unclassified	1 mo.	6 yr.	18 mo.	1	92	33	1	5	1.5

of 257 patients, indefinite pain or sense of fullness occurring under the sternum or over the precordium, and at times pains in various parts of the body, occurred in thirteen cases of the arteriosclerotic heart and hypertensive groups, and in six of the syphilitic group. Pain was not a marked symptom in any of the other groups.

Table V.—We have thought it would be of interest to determine the morbidity of cardiac disease as nearly as we could, from the history and duration of symptoms exhibited by the patients with heart disease, the number of days spent in the hospital, and the number of admissions to the hospital for the same manifestation. Those of us who have to do with the care of negro patients will readily appreciate the difficulty which one experiences in any attempt to obtain an accurate history, particularly as to the duration of symptoms, of almost any disability. This type of individual is usually one who complains very little and who notices his symptoms very little, unless they are of sufficient degree to cause complete or partial disability. Many of the cases were admitted to the hospital in the last stages of congestive heart failure, so that the duration of the stay is quite short. In many cases, the patients had noted no symptoms of any abnormality until the onset of the fatal condition. It is interesting to note that the cases of syphilitic heart disease gave shortest duration of symptoms. The number of admissions is most frequent in the syphilitic and arteriosclerotic groups.

Table VI.—Table VI shows the results of treatment of the 257 cases. The mortality is extremely high. This is explained by the fact that we can seldom see patients in the early stage of their disease, when preventive and other measures could be used to avoid congestive heart failure. Approximately 95 per cent of the patients in this group came to the hospital with most marked evidence of congestive heart failure, either on their first or subsequent admission. It matters not how thoroughly one speaks to these individuals of the danger of over-exertion, of exercise, and of straining, in the causation of cardiac failure. As soon as they recover a fair degree of compensation, they consider themselves well, and resume their normal physical activities. The mortality from heart disease among this class of patients will always be high, until we have the proper facilities to educate and care for the chronic colored cardiac invalid.

CONCLUSIONS

From a study of 257 cases of heart disease

TABLE VI—CARDIAC DISEASE IN THE NEGRO RACE—RESULTS OF TREATMENT OF 257 CASES

DIAGNOSIS	Improved	Unimproved	Died	Total	Mortality
Rheumatic heart disease	11	1	2	14	14.3
Rheumatic heart disease plus complications	2	0	2	4	50.0
Subacute bacterial endocarditis	1	0	2	3	66.7
Arteriosclerosis	9	0	5	14	35.7
Arteriosclerosis plus complications	1	0	3	4	75.0
Coronary occlusion	0	0	1	1	100.0
Hypertensive heart disease	6	1	9	16	56.2
Hypertensive heart disease plus complications	3	1	6	10	60.0
Arteriosclerosis plus hypertension	45	1	25	71	35.2
Arteriosclerosis plus hypertension plus complications	18	1	23	42	54.8
Syphilitic heart disease (aortic insufficiency)	16	1	19	36	52.8
Syphilitic heart disease (aortitis and aneurysm)	3	0	3	6	50.0
Syphilitic heart disease plus complications	10	0	7	17	41.2
Syphilitic plus complications plus arteriosclerosis plus complications	3	0	3	6	50.0
Congenital heart disease	0	2	0	2	00.0
Unclassified	6	0	5	11	45.4
	134	8	115	257	44.8

admitted to the colored division of Emory University, it is observed that 3.7 per cent of all admissions to the general hospital are due to cardiac disease.

(1) Heart disease occurs more frequently among the negro males than among the negro females.

(2) Rheumatic heart disease is the least common of all of the infections causing cardiac disability.

(3) Syphilitic heart disease causes the greatest amount of disability, next to the arteriosclerotic group.

(4) Arteriosclerosis with hypertension, or hypertensive heart disease without demonstrable arteriosclerosis, is the cause of 60.1 per cent of all cardiac admissions attended with a high mortality. The disability from heart disease is greatest and requires longest hospitalization in the arteriosclerotic group than in any other. The mortality is unusually high because of the marked state of congestive heart failure in which these patients are received.

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DISCUSSION (*Abstract*)

Dr. C. T. Stone, Galveston, Texas.—With the main points in Dr. Davison's paper I am in full agreement. Recently VanSant and I have reported a series of 950 cases of heart disease and of this number 414 were in negroes. If we take the important etiological groups, that is, the hypertensive, the arteriosclerotic, the syphilitic and the rheumatic, it is very interesting to compare the results of the studies that we made in negro patients with those made by Dr. Davison. The hypertensive and arteriosclerotic in his series were 61 per cent, in our series 56 per cent. The syphilitic in Dr. Davison's series were 25 per cent, in our series 32 per cent. The rheumatic in his series were 7 per cent, in our series 4 per cent. I think that this contrast proves very conclusively that heart disease in the Southern negro is essentially the same no matter in what part of the South the disease is studied.

If it were possible to rid the negro of hypertension, arteriosclerosis and syphilis, clinical heart disease in him would be of extreme rarity. Of course, that might apply in sections of the South to the white race as well, but certainly not with anything like the same effect that it would apply to the negro race. The studies of Dr. Jones, Dr. Kimbrough, Dr. VanSant and myself seem to indicate that the negro is less susceptible to rheumatic infection of his heart than is the white man, but he loses whatever advantage he has from this source by reason of his increased susceptibility to syphilitic heart disease. I believe that if an equal number of patients were taken, colored and white, with syphilis it would be shown that a considerably larger proportion of the negroes would develop syphilitic heart disease than of the whites. It appears also that the negro is very much more liable to develop hypertensive heart disease than the white man, and part of the increased frequency of syphilitic and hypertensive heart disease in negroes may be explained by the greater incidence of syphilis among them. An additional cause might be

hard manual labor, but after one has accounted for as many causes of heart disease among the negro race as is possible on this basis there seems to be another factor which adds a considerable burden to the incidence. That is something which is hard to define but which seems quite definite, the fact that the negro has probably inherited a defective cardiovascular apparatus, which begins to break down sooner than that of the man. This conclusion is further inspired by the fact that heart disease of the hypertensive type reaches its peak of frequency in the negro a full twenty years ahead of the time that it reaches its peak in the white man.

Another point which I wish to emphasize is the extreme rarity of angina pectoris in the negro. Dr. Davison reported one case in his series but after a fairly large experience with negro patients, I cannot recall having seen a single instance among them of the typical paroxysmal heart pain characteristic of angina. However, one sees a reasonable number of cases of coronary occlusion.

Dr. James E. Paullin, Atlanta, Ga.—Several years ago when Emory University took over the colored division of the hospital, it was apparent that syphilitic disease caused a tremendous amount of disability among negroes. That disability manifested itself with particular reference to the heart in lesions that have been classified by Dr. Davison. We were interested at that time in attempting to diminish the incidence of hospitalization of negro patients because of syphilitic heart disease. At one time we had on the negro male wards seven cases of aneurysm of the aorta which were hospitalized from two to four months. The expense incident to such hospitalization amounts to a large sum in the running of an ordinary hospital with a limited number of beds for negro patients.

The majority of patients who developed cardiovascular lesions developed them rather early, that is, within a period of from one to five years after their primary syphilitic infection, and the majority of these had had no treatment whatever for their previous syphilitic lesion. The disability resulting from that condition and the stage in which they reached us for treatment was at a period when practically nothing could be done to relieve them. A clinic was organized for the purpose of treating the syphilitic negro. As was brought out by Dr. Davison, syphilis occurs more frequently among negro men than women and the majority of patients with syphilitic infection have had no treatment whatever for their condition.

There is one type of pain that the negro does have, which is rather characteristic of a syphilitic lesion, particularly aortitis; it is a substernal compression, paroxysmal attacks of dyspnea with discomfort beneath the sternum without any radiation whatever. The only case of typical angina that we have seen, and the only one that I have seen in five years, was very typical. Whether it was due to syphilis or not I do not know.

Dr. Davison, (closing).—In all parts of the South from Texas to Virginia, the percentage of the cardiac group, classified etiologically is about the same. All reports to date show that the syphilitic group is exceedingly important, but that the arteriosclerotic and hypertensive groups from the bulk of heart disease in the negro.

We can hope to decrease the syphilitic group, but we must educate the negro in order to do so. We must have social workers to follow cases and see that they take treatment until they are cured of syphilis.

The case of angina pectoris that I reported was a typical one in a negro cook which came on suddenly one morning. She had ten attacks while in the hospital. That is the only case that could be classified as paroxysmal cardiac pain.

It is interesting to note the number of cases in the syphilitic group that had also arteriosclerosis and hypertension. So far as we could tell in this series, syphilis, *per se*, had nothing to do with the causation of arteriosclerosis and hypertension any more than another toxic or infectious condition might have.

LOBAR PNEUMONIA IN NEGROES: THE INFLUENCE OF SYPHILIS AS A CO-EXISTING DISEASE*†

By RAYMOND J. REITZEL, M.D.,
Galveston, Tex.

Two years ago there were more than the usual number of cases of lobar pneumonia in the colored ward of the John Sealy Hospital. The mortality was higher than usual. In watching these cases day by day and reviewing the clinical records at post-mortem we were impressed with the high incidence of fatal termination in patients who showed either a positive Wassermann or gross evidence of syphilis. We found ourselves making a guarded prognosis when the report of the Wassermann came back positive in a given case. Finally our interest became aroused to the point of reviewing the literature and our hospital records of lobar pneumonia to see if we were wrong in our clinical impressions.

Osler[1] states that the disease is more fatal among negroes; Cecil[2] says that the negro is more susceptible to lobar pneumonia; Chattard,[3] reporting in 1898, found a case fatality of 31.2 per cent in 250 cases compared with 30.6 per cent in native born whites. During the World War, Miller and Lusk,[4] at Camp Dodge, reported the mortality to be 12.9 per cent among negroes as compared to 9 per cent among the white soldiers. In their series there were 116 negro cases and 115 white cases of lobar pneumonia, although the colored troops numbered one-sixth that of the whites. Kelly,[5] in reviewing 6500 cases of lobar pneumonia at Cook County Hospital in Chicago over a period of seven and a half years, writes:

"Every year the case fatality in the male negroes has been from 5 to 13 per cent below that of the male whites, with a difference of 8.8 per cent for the entire

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seven and a half years. The female negro case fatality has been 4.6 per cent less than that of the white females in the same period. In two years, however, the difference favored the white females."

He further states: "When racial groups are further subdivided according to age, there is seen a greater case incidence among the whites in the older age group, in which the fatality is higher. For example, the incidence peak is in the 40-49 year group for the white males, and in the 20-29 year group for the colored males. When the age standardized fatality rates are calculated, using the age groups of the white males of 1917 as a standard, the case fatality for all persons is 37.1 per cent; white males, 37.6 per cent; colored males, 34.9 per cent; white females, 35.8 per cent; colored females, 35.9 per cent. The lower case fatality among the negro males persists through this age standardization. It is due to the relatively lower rates in the three upper age groups of 40-49, 50-59, and 60 years and over, in which difference 5.7, 12.3 and 14.7 per cent, respectively, favor the colored males. Had these groups in the colored males as high a case fatality as in the white males, the expected case fatality of the colored males with the age standardization would be 38.6 per cent."

In the John Sealy Hospital, during a period of seven years, 1920-1926, inclusive, there were in all 289 cases of lobar pneumonia, of which 143 were white and 146 were colored. The case fatality among the whites was 19.5 per cent as compared to 21.2 per cent for the negroes, not a great difference.

The total mortality in lobar pneumonia for the City of Galveston for this period was 154, of which 81 were whites and 73 negroes. The estimated negro population is about one-fourth that of the whites.

It is true, as was pointed out by Kelly, that it is the young adult negro who is more likely to contract the disease. In Galveston most of these cases are from the dock workers. Among the whites it is the older adult who is more likely to contract pneumonia. Syphilis seems to increase the mortality rate among the negroes, while alcohol appears to be more of a factor among the whites.

Nowhere in literature could I find any classification of cases of lobar pneumonia into syphilitic and non-syphilitic groups, probably for the most part because the Wassermann was not done. McNeil,[6] working in this clinic at an earlier date, showed that the incidence of syphilitic infection among apparently healthy negroes varies between 25 and 30 per cent. The incidence among the negroes sick with the commoner diseases averaged between 40 and 50 per cent. Among the 146 colored patients of this series (all cases of lobar pneumonia) 50 had either positive Wassermanns or post-mortem evidence of syphilis, and in this group the fatality was 28 per cent. There were 57 who had negative Wassermanns with a fatality of 10.5 per cent. Among the 39 cases, in which the Wassermanns were not reported, the fatality was 25.6 per cent.

A study was also made of the complications arising during the course of the disease in two groups. The incidence of empyema, meningitis, lung abscess, cardiac failure and delayed resolution was noted, but no appreciable difference in the occurrence of any of these complications could be made out for either group.

Stokes,[7] in his text book, makes the statement that "syphilis may be responsible for an unfavorable response to the infections, as in non-resolution of pneumonia, in occasional cases of recovery, when specific treatment is begun." According to Osler, delayed resolution occurs in 3 to 4 per cent of cases. Delayed resolution or unresolved pneumonia may be defined as an undue delay in reparative processes. Even though most of the clinical symptoms have disappeared, certain signs remain, sometimes for weeks or even months. The term is not applicable to the more serious complications such as tuberculosis, empyema, bronchiectasis, pleural thickening and fibrosis. These latter must be ruled out before making the diagnosis of unresolved pneumonia.

In 1919, Head and Seabloom[8] reported three cases of delayed resolution occurring in colored soldiers. The physical signs in one case were those of fluid at the base in which nothing was obtained upon aspiration. In another case there were crepitant rales at the bases, and in the third there were signs of consolidation remaining unduly long. Upon securing a positive Wassermann in each case, one to three injections of arsphenamin were given, after which the physical signs disappeared and recovery followed quickly.

Fitz-Hugh,[9] in 1923, reported three cases of delayed resolution in pneumonia in which the temperature did not return to normal, running in one case into the eighth week. The physical signs were, for the most part, those of fluid. Nothing could be obtained by aspiration. In all three cases the Wassermann was positive and prompt recovery came after the institution of anti-syphilitic treatment.

Dr. Simonton,[10] of Pittsburg, in discussing this subject, said:

"I wish to speak of one kind of case that has come under my observation: unresolved pneumonia in syphilitics. I have had three cases of this sort within the last year, in which persistent temperature was one of the features. The points which impressed me were the marked consolidation, bronchial breathing, and a ten-

dency to change in the character of the sputum. One important thing was the degree of involvement and the very little cough. With massive doses of mercury by inunction the temperature came down by lysis."

We know that syphilis may be responsible for delayed healing in fractures. It apparently is a factor in prolonging certain cases of pneumonia.

CONCLUSIONS

(1) The negro is more susceptible to lobar pneumonia than the white man and has a greater case fatality from this disease.

(2) A higher death rate is found among those who have syphilis as a co-existing disease.

(3) Syphilis may be the cause of a delayed resolution in lobar pneumonia.

(4) In all cases where there is non-resolution a Wassermann should be done and, if it is found to be positive, the patient should be promptly put on anti-syphilitic treatment.

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EXTENSIVE RESECTION OF THE SMALL INTESTINE*

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That wonderful provision has been made in the construction of the human body to provide for the carrying on, in the face of disease or injury to the viscera, is evidenced by the fact that numerous cases have been quoted in which individuals have been able to live in comfort and health with the absence of some portion of their anatomy. One can and does live in comparative comfort with one lung. A lung has been removed for disease or injury; a lung has been collapsed, its function being entirely suspended, putting it entirely at rest in order to arrest disease. The stomach is an organ of convenience, not one of necessity. Gastrectomies are performed, partial and complete, glands being developed in other portions of the intestinal tract to carry on the function of the stomach, and individuals live in comfort and health with little or no interference with their daily habits of diet. Individuals live with one kidney, the remaining kidney compensating and doing the work of both without serious inconvenience. An individual has lived with only two-thirds of one kidney remaining. The entire colon or large bowel has been removed. We all know of thousands of cases of resections of the gall bladder and their uniform good results and their restoration to a good state of health.

A recent case that came under my care in which extensive resection of a portion of the small intestine was necessary prompted me to wonder how much of the small intestine an individual could live without. The recent literature was searched for cases of resection of the small intestine with reference to the physiological basis of recovery. A resume of these cases may be of interest.

Since recovery from operations involving small portions of the small intestine is well established as possible, only those cases will be referred to in which approximately one-third or more of the average length was removed. The total length as stated by Treves to average 675 to 683 cm.; by Jonnesco 750 cm.; by Dreike 600 cm.; by Beneke 387.5 to 389 cm. for every 100 cm. body length. Beneke's estimate would therefore be 640 cm. for an individual 165 cm. in height; but he appends the statement that these figures hold good only for those races whose diet is largely mixed, in the more purely vegetarian races such as the Japanese, the length of intestine being proportionately greater.

The total length of the intestinal tract is 810 cm.; the length of the small intestine from 630 to 660 cm., but when it is attached to the mesentery from 420 to 480 cm. The large intestine is 150 to 165 cm. long.

It has been stated that the maximum danger point in removing the small intestine is between 150 and 180 cm., and it has also been stated that one should not remove more than the height of the individual. This would indicate that the length of the intestine has some relative proportion to the height of the individual.

Extensive resection of the small intestine in

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an infant of two years is reported by Jackson, the operation having been performed March 13, 1916, for relief of a strangulated internal hernia through a congenital mesenteric foramen. Some observations were made of the patient over a period of seven years following.

In this case 142 cm. of gangrenous ileum and the involved mesentery were removed, the lower end of the resected intestine being about 60 cm. from the ileocecal valve. The patient was practically moribund, three days having elapsed between the first signs of illness and his admission to the hospital, and no anesthetic was used save local infiltration of the tissues with cocain solution. Hot saline solution, 500 c.c., was poured into the peritoneum before closing the abdomen; hypodermoclysis was given before and throughout operation and repeated after. The condition of the patient during the following forty-eight hours remained extremely critical. Vomiting occurred three times in large quantities, but of greenish vomitus, not stercoraceous as on the day preceding operation. The patient stayed in the hospital for thirty days, convalescence being interrupted by a wound infection, otitis media, and bronchopneumonia. During this time the bowel movements averaged eleven a day. Hyper-irritability of the bowel continued in as severe a degree during the year following discharge from the hospital, and signs of diarrhea were noted during the four years following, though with gradual improvement. Throughout this time the boy was thinner than others of his age, though equal to active pursuits and play, and displayed a ravenous appetite at less than the usual intervals between meals. Gastro-intestinal disturbances, consisting of abdominal pain, nausea and severe diarrhea, occurred several times during each year, with loss of weight during these attacks, but rapid recovery after. During the year preceding the last examination, at the age of nine years, the child was quite free from such illness and his general health and habits had become normal and his appearance well nourished. Laboratory examinations at this time showed a normal urinalysis and normal stools with regard to nitrogen, fat and carbohydrate elimination.

Jackson concludes that during these seven years of growth and recovery a compensatory hypertrophy, giving evidence of considerable adaptive power in an individual of this age, may have taken place. The average length of the small intestine in such a case having been recently estimated by Bryant to be 425 cm., the portion removed is concluded to have been about one-third of the whole.

Sarnoff reports the resection on April 6, 1923, of 450 cm. of the small intestine in a case of prolapse of the intestine through the vagina, the uterus having been perforated by curettage with trauma of the broad ligament and hysterectomy being also performed. The portion removed consisted of the lower part of the jejunum and practically all of the ileum. The post-operative condition was considered fair, but there was found to be little or no absorption in the gastro-intestinal tract for the following two or three days. The dilatation and consequent gastric distress were relieved by gastric lavage three to four times daily for the first week; fluids were administered in large quantity by hypodermoclysis and with 2 per cent glucose and sodium bicarbonate by rectal injection; at the end of a week fluids and light nourishment were given by mouth. During this period diarrhea was evident, but gradually ceased, and after eight days was no longer troublesome. Recovery was complicated by a partial intestinal obstruction on the twenty-sixth day after operation and the spontaneous establishment of a fecal fistula, which healed within four weeks, at the end of which time the patient appeared well nourished and in good health, with no symptoms of diarrhea or of constipation.

Sarnoff does not conclude that there is a compensatory enlargement, but that there is compensatory activity in the remaining intestinal mucosa to make up for the loss of secretory and absorptive surface.

Watson reports a case of resection of 228.5 cm. of small intestine in a woman aged 63, who made an uneventful recovery and was in full possession of health at the time reported, three years later. The operation, performed April 13, 1920, consisted in the removal of gangrenous ileum, sharply defined proximally, but merging gradually distally into healthy bowel 45 cm. above the ileocecal junction. The only discoverable cause was thrombosis of the mesenteric vessels, which was evident for at least 5 cm. from their attachment to the affected intestine, though no cardiac lesion or hepatic cirrhosis, as are commonly found in such cases, was present. The post-operative treatment consisted in giving saline solution intraperitoneally before closing the abdomen and saline rectal injections with 1 c.c. of pituitrin by hypodermic every four hours for the first 24 hours. None of the nutritional disturbances (of which diarrhea furnishes the most common symptom) was encountered in this case. The patient was discharged from the hospital on the twenty-eighth day and resumed her regular diet and occupations (which included such active duties as housework and washing for her family) upon her return home.

Watson has collected and made a clinical study of 73 recorded cases, including his own, of extensive resection of the small intestine, among which are reported the following:

Koeberle, 1881, resected 205 cm. in a woman aged 22. No digestive disturbance following complete recovery. This is the earliest such case on record.

Flint, 1910, resected 100 cm. (ileum) in an infant aged eleven months, with good recovery, after signs of metabolic disturbance during the first fourteen days. The total length at this age was 270 cm.

Lauwer, 1901, removed 265 cm. from a woman aged 65 years.

Quarry Wood, 1920, removed 218 cm. from a woman over sixty years of age, a case of strangulated hernia of three days' standing. There was complete recovery.

Brenner's case, reported by Denk in 1910, is the longest resection recorded: 540 cm. were removed in gangrenous condition in a case of strangulated femoral hernia in a woman aged 61, with excellent post-operative recovery. Weight and strength were regained for two years, death occurring two and one-half years later of marasmus. This case at autopsy showed no compensatory hypertrophy, but atrophy of the omentum.

The experiments of Evans and Brenizer point to the conclusion that removal of 80 per cent or

less of the total length of small intestine is compatible with recovery in dogs. Flint reports in these animals a compensatory hypertrophy of the remaining portion involving mainly the mucosa, and consisting of an increase, both in number and size of the villi, to even 100 per cent of their diameter which would increase their surface about 300 per cent. The size and number of the goblet cells is also increased numerically per unit of surface area though not relatively to the total cell distribution. The epithelial characteristics of the tunica mucosa present changes which are not qualitative but are based on an increase in size of the individual cellular elements, which possess increased dimensions of nuclei as well as of cytoplasm and are higher by 30 to 50 per cent. This mucosal hypertrophy occurs in the region of the crypts as well as of the villi and is the most obvious in the whole hypertrophic process in which, however, the submucosa, now observed to be denser and with more numerous nuclei, and the muscularis, particularly the inner circular layer, take a notable part. This prompt and striking response cannot be accounted for chiefly as a simple mechanical effect although it does, (following the symptoms of tissue thirst and hunger displayed by the subjects of the operations and experiments cited) undoubtedly enter into the process. It is far more largely to be explained as a complex increase of functional activity into which enter the factors of primary diminution of absorption of fats and nitrogenous substances (and to a less degree temporarily, of carbohydrates) with increase in the excretion of these essential components of intermediary metabolism and consequent destruction of the normal balance between ingestion and elimination, whereby the necessity arises for improvement in the efficiency of the remaining absorptive surface in order to maintain the nutrition of the organism.

If such adequate compensation takes place there is good functional recovery which, on a clinical basis, was reported in 64 per cent of the cases studied by Watson. The tendency to record only the successful cases must, however, be taken into account, operations such as those described being determined always by necessity and performed often under such unfavorable conditions that a fatal outcome is more to be expected than recovery. In Flint's animals it was found that a diet relatively rich in carbohydrates and poor in fats was a favorable factor and that if unlimited diet were given, removal of 65 per cent or over would prove fatal, death resulting from marasmus or enteritis. These results are supported by metabolic studies made by Wildegans on such animals. Though the experiments of Senn, Trsynecki, Monari and others are held by Jackson to prove that a relatively greater proportion of the total length may be removed in animals than in man, it is stated by Warbasse that removal of up to 80 per cent in man is compatible with life. Such estimates can at best be made with only approximate verity, for the results must depend less upon the exact length of intestine removed than upon its proportion to the whole, or upon the length remaining, which in those cases that recover cannot be determined clinically. It may be reasonably assumed that a limit of safety corresponding very nearly to that estimated by the observers mentioned above was reached in Brenner's case, in which the 540 cm. removed would have been 80 per cent of an estimated total average length of 680 cm. or 90 per cent of a total of 600 cm. In the experiments of Evans and Brenizer those animals in which from 86 to 92 per cent of the total length was removed, died and no compensatory hypertrophy was found at autopsy.

With regard to the relative value to the organism or dispensability of the different divisions of the small intestine, it is said by Sarnoff that the ileum may be more safely removed than the jejunum, though he concurs in the statement of Wildegans and others that either part remaining tends to compensate for the other. It is to be remembered that the jejunum is of greater average diameter than the ileum, the small intestine being of gradually diminishing size from 47 cm. at its upper to 27 cm. at its lower, end. Furthermore, it is thicker walled and more vascular and has more well developed plicae, thus presenting in every way possibilities of greater physiological activity of mucosal surface. That the jejunum may, however, be removed in certain cases is indicated by the report of Diliberti and Herbin, who removed the upper half of the small intestine from one dog and the lower half from another with recovery in both cases after temporary evidences of lack of assimilation of nitrogenous foods and fats. It is noteworthy in this connection that the removal of the ileum destroys the Peyer's patches which are now definitely known to be glands preventing leakage through the intestinal wall of bacteria swept into the ileum through the ileocecal valve during antiperistaltic action of the proximal colon. This bacterial invasion of the ileum must be given consideration also in resection of the entire colon, a great additional demand upon their defensive activity being thereby thrown upon the Peyer's

patches, which under ordinary conditions effectively prevent systemic bacterial invasion.

These recoveries may be accounted for by the conclusion that the small intestine rarely functions to the limit of its capacity but possesses great reserve power which will, under favorable dietary conditions, be equal to a large amount of added work but, on the other hand, will break down under adverse conditions which could be well borne by a normal individual.

For functional purposes it is undoubtedly true that there is present in every organ of the body reserve tissue which may be called upon for functional purposes in any exigency that arises. For example: it is a rare thing that all the muscle fibers of a given muscle or group of muscles takes part in any contraction. In long continued use of any muscle there is alternation of contracting adjacent muscle fibers thus resting parts of the muscle all the while. Moreover, the individual muscle fibers, when active, do not always contract to their utmost possible extent.

The blood supply, too, keeps pace with this varying functional demand. In resting muscles many capillaries are practically obliterated and dilate markedly when the muscle is active and in emergency contractions open up to the largest possible lumen.

In this connection, the reserve power of the heart muscle undoubtedly based on the partial use of these muscle fibers responding to varying demands of contraction, may be emphasized.

What is true of muscle is equally true of glandular function. Not all of the cells of any one gland are active in normal demands for glandular secretions and it is only when an emergency arises that all the cells cooperate.

These findings go a long way to explain on scientific grounds the length of intestine that may be taken out so that the remaining portion will still function for normal demands though at first undoubtedly exigencies cannot thus be provided for until compensatory factors intervene, such as enlargement of the individual glands remaining active.

The case which prompted this thought was a white male, aged 24, height 165 cm. operated upon December 22, 1926. His weight before operation was between 125 and 130 lbs. and it is the same today, 11 months later. He was brought to the infirmary with a diagnosis of intestinal obstruction. On opening the abdomen if proved to be one of volvulus which had produced gangrene of over 125 cm. of the ileum. It was necessary to resect 137.5 cm. of the ileum doing an end-to-end anastomosis. The patient made an uninterrupted recovery showing no symptoms of shock and little or no inconvenience during his convalescence. He left the infirmary in approximately two weeks, resumed his vocation (that of a clerk in the United States Post Office) within a month, and has been apparently in perfect health, not showing any evidence whatsoever of digestive disturbance. It is of interest, also, to know that this same patient was operated upon in July of the same year for supposed giant colon (Hirschsprung's disease) at which time the abdomen was closed and nothing was done. The giant colon was then treated by diet (roughage) and pituitrin was administered to restore the muscular tone of the bowel. This relieved the condition entirely and he was in good health until his recent illness of volvulus.

At the time of the operation for the resection of the intestine the large bowel was normal in appearance and size.

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DISCUSSION (*Abstract*)

Dr. Joseph Colt Bloodgood, Baltimore, Md.—I wish to describe to you two cases which demonstrate that we need a certain portion of the small intestine for life.

The first was an operation on a dog which I made in 1890 at the University of Pennsylvania, following the suggestion of Nicholas Senn. He advised us to open the abdomen of the dog under ether anesthesia, pick up the first small loop of small intestine and suture it to the stomach. I did that in my first case, and the dog died of starvation. We observed that anything the dog ate appeared in a few moments at the other end. At autopsy I found that I had anastomosed the rectum to the stomach.

The second case was in a human being, who recovered. A child of ten had symptoms referable to the appendix, an abscess. When I explored the abdomen I found an abscess in the mesentery of the small intestine. As I opened the abscess I pulled out a long worm which had perforated the appendix into the mesentery. In order to drain the abscess and save the child's life I had temporarily to shut off most of the small intestine. I made an enterostomy of the small intestine at a point as low as I could from the duodenum. The abscess drained and the child recovered from the operation, but gradually went into a starvation delirium. It was my first opportunity, and practically my last, to see starvation delirium. The child was in the condition of a patient with typhoid fever. Whatever she ate came out of the enterostomy almost as quickly as it had in the case of the dog. She stopped playing and did not know her family, and we had to try to reinstate the small intestine. We would suture it with fine silk, the child would gradually pick up, pass temporarily out from the starvation delirium, then the enterostomy would break down and delirium would begin again. We did not know the resistance to peritonitis at that time, more than twenty-five years ago, so we did not deliberately resect the enterostomy but did a lateral anastomosis below the enterostomy, and packed it with gauze, fearing peritonitis. Today, of course, we would

not consider it necessary to pack with gauze. The child finally made a complete recovery.

These two cases demonstrate that we must have a certain part of the small intestine.

A third story is really more important than any. One of the great physiologists said that human beings had too much of everything except brains.

Dr. J. A. Crisler, Sr., Memphis, Tenn.—A few years ago I was called in consultation to see a case which had been diagnosed as acute appendicitis of two days' duration. All the necessary preliminary examinations had been made and I immediately concurred in the diagnosis. I found the patient in a rather upright position, in bed, the abdomen enormously distended, smoking his pipe in perfect comfort. We carried him to the hospital at once and made an opening through the right rectus, a thing I probably would not do now, since Dr. Jabez Jackson has taught us the impropriety of operations with the distended abdomen, but at that time we felt that immediate operation was the best thing. On opening his abdomen the first thing we saw was a very black cecum and an appendix that was as black as a patent leather shoe. We knew we had a case of gangrene, but could not tell how extensive it was, so enlarged the incision and sought for some healthy intestinal tissue on which to do an anastomosis, because the serosa was slipping. We finally succeeded in getting out all of the intestines, except the sigmoid and about five feet of the jejunum. When we got this out the serosa was slipping over all the intestines and we found we could not get the intestines back, so we cut off all but five feet of the jejunum and the descending colon. There was no hemorrhage because the mesenteric stalks were twisted on themselves, and remained twisted after the removal. Carrying out the surgical program we stitched over the mesenteric stalk and kept the man from future hemorrhage that would probably have occurred before he could die a natural death. He lived for three days in perfect comfort, with nothing unusual except that on the second night he was unable to void and the interne was asked to catheterize him. He called me over the telephone and said he was unable to obtain any urine from the bladder. I called on the patient and found him up in the corner of the room with a washpan, in which he had voided a basin full of urine. He walked back to the bed and I picked him up and laid him down, and he died suddenly, probably from a coronary embolus.

This was a case in which it was necessary to remove too much intestine, knowing at the time that the patient could not recover.

Dr. William D. Haggard, Nashville, Tenn.—I once had occasion to resect fourteen feet of intestine for strangulated hernia, and it is unnecessary to say that the man died.

Some years ago Ellsworth Elliott said that no infant had survived resection of the small intestine for intussusception. Since that time a few cases have been reported, one by William J. Mayo, who ascribes the cure to the fact that he allowed the infant to go home with its mother. He did not hospitalize the baby.

In intussusception it is a good plan to inflate the colon with air and reduce the intussusception, then immediately do an abdominal section and see that the last kink is ironed out. Inflation is a great help.

In resection of the large intestine it is important to make sure not to go too far on the mesenteric attachment in ligating beyond the point of resection. It may be too far along and injure the blood supply. It would not seem necessary to call attention to this, and the way to prevent it is perfectly obvious, namely: to put a rubber clamp where you are going to resect so you can not go any farther. In resecting the right half of the colon, if the lumen is broad, it is closed by a purse-string suture which is brought up in the wound and a small pack placed to keep the wound open at that point. This was brought out by C. H. Mayo. If there is trouble with gas on the third to fifth day, one can push a scissors down and open up the purse string and make a temporary fistula, which will give immediate relief. Like most fistulae in the large intestine, it will usually close spontaneously.

In the consideration of resection the question of enterostomy comes up for the drainage of the septic fluids that have been retained. Above the obstruction fermentation has been going on and that fluid if allowed to enter the empty intestine below the obstruction will be absorbed with its alkaloidal poisons. Formerly Moynihan had a long glass tube which he inserted and he recommended that the intestine be threaded over this until many distended loops were emptied. That causes considerable trauma, but is safer than leaving the foul fluid above the obstruction for further absorption. It is better to take an ordinary test tube and insert the flange end of this tube into the intestine and hold it by a purse-string suture. With a rubber tube on the other end and through the vaselinized hand of the operator allow the intestine to be pulled through by the gloved hand of the operator, and all the contents will be expressed through this tube into a basin. It can then be closed. This is much better than the enterostomy only, which sometimes does not drain. If one uses an ordinary catheter it is necessary to irrigate and syphon out this material with soda solution.

REPORT OF TWO CASES OF SUPPURATIVE LYMPHADENITIS OF THE MESENTERY OF THE SMALL BOWEL*

By J. S. TURBERVILLE, M. D.,
Century, Fla.

Case 1.—Myrtle C.: Three-fourths American Indian, a native of Alabama, age 13, female.

Her family history was unimportant. She had had the usual diseases of childhood, and influenza, at 10. Menstruation had not appeared.

The present illness began with boils and fever two weeks before I saw her, and she had had fever at intervals and since. Eleven days ago she began to have pain and soreness in the left lower abdomen. She had been nauseated a time or two but did not vomit until a week before. There was no special pain on urination or defecation.

Physical examination showed heart normal, systolic pressure 110, diastolic pressure 65, lungs normal. In the abdomen there was a mass about four inches in diameter to the left of the umbilicus, which seemed to have no connection with the left hypochondrium

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or pelvis. The vagina admitted one finger, but neither here nor by rectum could anything be felt. The urine showed a few pus cells and a few hyaline casts. The mouth and throat were normal. There were 17,000 white blood cells: 88 per cent polymorphonuclear neutrophils, large lymphocytes 1 per cent, small lymphocytes 10 per cent, eosinophils 2 per cent.

The diagnosis was an inflammatory mass to the left of the umbilicus.

As the patient was in very poor condition it was decided to use a combination local and ether anesthesia. A left trans-rectus incision was done, and an inflammatory mass to the left of the umbilicus that reached to the brim of the pelvis was found. This was beneath the left end of the transverse colon. The omentum was only loosely attached to it. The hand could be put under the mass, which was found to be the left extremity of the greatly swollen mesentery of the small bowel. The intestines were all packed away, and the mass entered by a small incision perpendicular to the lumen of the gut and spread apart with forceps. The pus was sponged out, and a drainage tube placed in between the leaves of the mesentery and one just outside of, and below this. The omentum was then snugly wound round these tubes. The abdomen was closed by layers.

In spite of a bad wound infection, convalescence was steady. A few days after operation there was a blistered surface on the external aspect of the left leg which resembled a hot water burn. But the mother and others in attendance were sure that no hot water bottle had been used here. It was concluded that it was a pressure sore because the patient had been kept too long on the left side to favor drainage. It was found that the patient had hookworn infection, for which she was treated before leaving the hospital. She made a good recovery and is well today. She was operated upon July 17, 1926 and was discharged on August 15, 1926.

Case 2.—Eugene F.: A white American boy, age 12. The family history was unimportant. He had had whooping-cough at 12 years, mumps at 9, malaria four years previously, and influenza at 3.

The present illness had existed for seventy-six hours. It began with pain in the mid abdomen. Twenty-four hours later, after taking oil, he was nauseated. The bowels moved well from the oil but the pain continued. He had been very sore in the abdomen and had had pain and one to two degrees of fever steadily. Twenty-four hours from the onset soreness was more to the left side of the abdomen. However, there was some soreness in the abdomen prior to the present attack, and the mother stated that before this he had complained of pain after taking food. She was not certain of the length of time he had suffered in this way, but thought it was caused from exercise on a gymnastic bar.

Physical examination showed the heart normal, systolic pressure 120, diastolic pressure 70, lungs normal. The abdomen showed cutaneous tenderness to the left of the umbilicus and on a line to the anterior superior spinous process of the ilium to about the midway point. There was a tender area to the left of the umbilicus of about two inches in diameter, and at this point a mass of about the same dimension. The temperature was 98.6° F., pulse 80, white blood cells 15,200, polynuclear neutrophils 89 per cent, small lymphocytes 11 per cent. The diagnosis was not made, except, acute surgical abdomen.

Operation was performed May 5, 1927. A left transrectus incision was made with the umbilicus as a central point. The left end of the mesentery of the small bowel was found greatly inflamed and thickened, and several of the lymphatic glands were enlarged and inflamed. One had broken down but had not ruptured either leaf of the mesentery. The omentum was loosely attached. After isolating this area with moist sponges, an exploring needle was introduced into the one that appeared broken down, and thick odorless pus was found. The gland was opened in a direction perpendicular to the gut, spread apart and the pus mopped out. One drainage tube was placed in the abscess cavity and another just outside and below this one. After removing the packing, the omentum was wound round the tubes. There was considerable wound infection, and three days after operation pain and elevated temperature returned. This subsided to return again about a week later. Each flareup receded after a free discharge of pus. His convalescence on the whole was progressive, and he made a good recovery, being discharged from the hospital on June 13, 1927.

In both cases the masses were free except for the slight attachment of the omentum which was fastened to the superior surface of the mesentery. The opening for drainage was made in the superior leaf of the mesentery, as it was thought that this would make scattering of pus less likely and allow the use of the omentum for wrapping the drainage tubes.

In the literature to which I have access there is very little that can be found regarding this subject. It is mentioned in Davis' "Applied Anatomy," and by Wilensky in the *Medical Record* of Nov. 6, 1920, also by Wilensky and Hahn in the *Annals of Surgery* June 1926. It is mentioned as a reference in *The Journal of American Medical Association,* Feb. 19, 1926. (Peers).

Davis does not say which end of the mesentery is oftenest affected, but by inference the right is meant. Wilensky, and Wilensky and Hahn report cases only of the right end. Their cases were practically all in adolescents or very young persons.

It is surprising that this has not been found often, when we think of the diarrheas and intestinal parasites, which directly affect the intestinal mucosa, and recall the other inflammatory lesions of the abdomen. Perhaps many late cases of abdominal inflammation in which only drainage is done are cases of this nature. No doubt many are diagnosed as appendicitis, a normal appendix is removed and no further search made, the real pathological condition being overlooked. It is possible that many of them subside without suppuration, as it is often observed that lymphatic glands will enlarge, become tender and painful, yet most of them do not suppurate.

I believe that with earlier operations in acute abdominal conditions, and a not too easily satisfied mind, more of these cases will be found and reported.

In regard to the two cases reported the cause of the first might have been either furunculosis or hookworm infection, the second may have been of traumatic origin. Wilensky in the *Medical Record* reports three cases of which two were suppurative. Wilensky and Hahn reported eight cases operated upon of which two were suppurative. In the discussion they conclude that the appendix does not play a role in the causation of this rather infrequently observed condition.

According to the Thirteenth Edition of Gray's "Anatomy," the glands are more numerous near the root and at the extremities of the mesentery, and are placed

in the meshes between the superior mesenteric vessels. Also, the lymphatic vessels of the cecum, ascending and transverse colon, drain into their own glands and thence into those of the mesentery of the small bowel. Those of the transverse colon form an uninterrupted chain with the mesenteric glands. Therefore, lesions of the small intestine, cecum, ascending and transverse colon, may cause infection and suppuration of these glands.

ROENTGENOLOGY IN THE MILITARY SERVICE*†

By CHARLES L. MAXWELL, M.D.,**
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A general discussion of roentgenology in the military service would be incomplete without a brief resume of the discovery of the x-ray and a short word-picture of its discoverer. William Conrad Roentgen was born March 24, 1845, on a farm in Lennep, East Prussia, and his early education was pointed toward a career of an agricultural character. He attended school at Apeldoorn in Holland and the Polytechnic at Zurich, graduating with the degree of doctor of philosophy. He became associated, after graduation, with the physicist, Kundt, and remained with him until 1879, excepting one year as professor of mathematics and physics in the academy at Hohenheim. In 1879 he became professor and director of the Institute of Physics at Giessen, Bavaria, and in 1888 was called to Wurzburg as director of the institute there, making a steady progress from a junior in physics to the directorship of the department of physics in this famous school. Here in 1893 he made the discovery which gives him prominence for all time in the Hall of Fame.

While conducting experiments by passing an electric current through a vacuum tube he laid this tube, still in operation, on a book in which had been left a key, and under which lay a photographic plate. A short time later he took the plate out for photography, made an exposure, and, much to his amazement, on developing the plate, he found the imprint of the key. His consideration of this quite accidental occurrence led shortly to the discovery of the x-ray.

He continued his work as a physicist and lived to see the fruits of his endeavors develop into a great medical specialty and a boon to humanity. He died February 10, 1923, in Muenchen, Bavaria, at the age of 78. Of him, it may be said "His was a long life and a full one."

Army and Navy medical officers greatly needed the x-ray at just the time it was discovered. They were experimenting with the new type of high velocity bullet, as to its effect on tissues, and the x-ray gave them immediate means of studying its effects without further disturbance of the anatomy of the various parts. Medical officers of the services, as early as any of the pioneer roentgenologists, may be mentioned as pioneers in this work, and the names LaGarde, Borden and Gray of the Army, and Stokes of the Navy, are among those who took an early interest and realized the importance of the discovery.

The use of the x-ray in the Spanish-American War still further demonstrated the possibilities of the new discovery, and its use in the Army has kept pace with its advancement in civil life.

With the advent of the oil immersed high tension transformer and the Coolidge tube, roentgenology in the military service has become as elsewhere much less an art and much more a science, and at the present time is beginning to share its rightful place among medical specialties.

A consideration of military roentgenology at once divides the subject into two parts: (1) military roentgenology in peace time; and (2) military roentgenology in war time.

I shall take up, first, the subject of military roentgenology in time of peace, passing over those subdivisions in which the civilian and army specialists have much in common and stress those which have a peculiar interest to the army medical officer.

(1) X-ray mechanics and physics.
(2) Examination of recruits.
(3) Examination of malingerers.
(4) Foreign body localization.

Roentgenologists of the Army are especially interested in x-ray physics and mechanics. They are given considerable instruction along technical lines, as it is expected of them when they are rated as specialists that they will not only be able to take of and interpret x-ray pictures, and give therapeutic treatments, but will also be able to install equipment and make such ordinary repairs as may be necessary. In ten years' experience it has never been necessary for me

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to go outside the Medical Department of the Army for assistance in the solving of technical difficulties.

The use of the x-ray in examination of recruits has not been given a great deal of consideration until the past few years, and then but sparingly. As the knowledge of its efficacy increases and its merit in assisting the ordinary methods of examination is more appreciated, especially with regard to chest abnormalities, the use will increase; and I am confident that the day is near when an x-ray chest survey will be an accepted requirement in all recruit examinations.

A recent survey of the tuberculosis situation in the soldiers of the Hawaiian department for the years 1923, 1924 and 1925 showed that between four and five out of every thousand recruits examined had a manifest pulmonary tuberculosis that was not found at enlistment under the existing method of examination. The money spent on these cases during their sojourn in the Army and their subsequent care at the hospitals would pay for x-ray chest surveys on all recruits.

In the examination of men suspected of malingering the x-ray is especially valuable and negative reports are most helpful in solving these difficult cases. I might cite one instance which came under my observation.

A soldier was admitted to a local post hospital and looked the part of an advanced tuberculous patient. He said he was very sick. An examination of sputum revealed tubercle bacilli. No x-ray of the chest was made at this time and he was transferred at once to the General Hospital with a diagnosis of active pulmonary tuberculosis. I happened to be the admitting officer on his arrival and recalled his case when he was sent to me as a litter patient for a chest examination. He had the appearance of one having advanced tuberculosis. I did not consider it necessary to fluoroscope him at this time and had my technician take his picture. To my amazement, the following morning when I had examined the film I found an absolutely clear chest. I questioned my technician as to the possibility of a mistake in the numbering of the case; and then, still doubting, retook the picture and found as in the first instance no lung disease. Our clinician about this time came to me, saying that he, after a searching examination, could find little or no lung abnormality, but that the patient was still having a positive sputum for tubercle bacilli. By this time we began to wonder about it all and the first thing we did was to certify the sputum specimens. They at once became negative. After a few days more of observation the soldier was informed that we knew that he was malingering, that he had no tuberculosis and that the sputum specimens had been stolen by him from known tuberculous patients. He was then placed under the psychiatric service and given a complete psychoanalysis and after this and such other treatment as was indicated, he was returned to a duty status. Three months afterward, just before I left the hospital, I inquired about him and found that he was still doing duty and without complaint.

In the neuro-psychiatric service x-ray examinations are invaluable and give the psychiatrist information which might otherwise take months to secure.

Flat foot is a common cause for attempts to evade military duty. I have never seen a case of flaccid flat foot which has been negative by x-ray examination for bone or joint disease that could not, by the usual clinical methods, be corrected sufficiently for the man to do full duty.

Foreign body localization is a comparatively rare examination in peace time and a most common one in war. In peace time the roentgenologist must take every opportunity to perfect his technic so that in the event of war he will be able, without further training, to give adequate and efficient service. The Medical Department of the Army has developed a unit for foreign body localization, which contains a complete Hirtz compass, Stroll wire, and Blaine paralax method, the stick with metal tip, and Sweet localization apparatus for foreign bodies of the eye.

In peace or war, the same general scheme of procedure applies in the x-ray department of a military hospital as in civil practice. The department is in charge of a graduate in medicine with special training in roentgenology and with him are assigned the necessary personnel, dependent upon the size of the hospital and the amount of x-ray work required. These include:

(1) Assistant roentgenologist.
(2) Nurses.
(3) X-ray technicians and assistant x-ray technicians.
(4) Dark-room technicians.
(5) Filing clerks.
(6) Orderlies.

In the smaller hospitals, one man may be called upon to fulfill all positions, but in the general and station hospitals a much larger personnel is required, as, for instance, at the Walter Reed General Hospital, where an active x-ray service is maintained, there are at this time a nurse, nine enlisted technicians, clerks and orderlies in the x-ray department. This Hospital also has a roentgenologist and an assistant roentgenologist, both trained medical officers.

The training of army personnel in roentgenology in peace time falls into two subdivisions: (1) the training of medical officers; and (2) the training of enlisted personnel.

Medical officers, when entering the Army, re-

ceive a basic course in roentgenology at the Army Medical School, where an endeavor is made to add to the knowledge of x-ray gained at medical school and during the internship, and to give them special knowledge along the lines most needed in military work. Much stress is placed upon the knowledge of normal anatomy in this course and the student officers are so instructed that even if they do not recognize pathological processes as due to certain diseases, they will be so well versed in the normal anatomy of the part that they will at once realize that they are dealing with some abnormal condition.

To those medical officers who desire and show special adaptability along roentgenological lines, the Medical Department of the Army offers two special post-graduate courses, one an advanced course of from four to six months in the x-ray department of the Army Medical School, and the other a year's special training at some well recognized civilian x-ray department. With this training the Army medical officer, if he desires and has the ability, may place himself on a status at least equal to the average specialist in civil life.

A four months' course is conducted at the Army Medical School for the training of the enlisted personnel as x-ray technicians, twice a year. Graduates of this course are qualified to take charge of small x-ray laboratories in posts where no specialist is assigned, and to act as assistants to the roentgenologist in stations where specialists are maintained. This technician's course comprises an extensive study in exposure and dark-room technic and also gives a comprehensive knowledge of x-ray physics and mechanics, and as a consequence the graduate is able to accomplish all minor repairs on his machine. The Army offers an excellent opportunity for training in this specialty for those who are interested in x-ray work, and graduates of this course are in constant demand for civil positions.

The peace time equipment is divided into two parts: (1) the equipment in use in Army hospitals; and (2) the war reserve.

The active equipment is of the standard type in use in all modern x-ray departments and the quantity depends upon the size of the hospital being served. General hospitals are equipped with a 220,000 volt machine for deep therapy, one or more 100,000 volt machines for roentgenography and superficial therapy, and in addition such fluoroscopic and bedside units as may be required. Station hospitals are equipped with 100,000 volt machines plus fluoroscopic apparatus and one or two bedside units. The smaller posts are equipped with a bedside unit with such fluoroscopic attachments as go with the bedside unit fluoroscopy. All have adequate dark-room accessories.

The war reserve consists of such of the above type equipment as it may be deemed necessary, plus the field x-ray units.

Military roentgenology in war time is but a rapid expansion of the peace time personnel and equipment with the addition of a mobile field unit. The best field unit we have at this time, and a search of the records shows nothing in other armies to be superior, is called the Shearer x-ray unit. The name Shearer has been kept in honor of Professor Shearer, physicist of Cornell University and designer of the unit, who recently died. But for the cessation of hostilities this unit would have been placed into active service during the World War. This field equipment is such an excellent piece of work that I wish to give you the details of its composition. At present it is composed of nineteen boxes and crates, all so built as to stand the most rigorous handling. The itemization is as follows:

(1) Box 1 contains a Delco electric generating set of 1000 watt capacity, alternating current.

(2) Box 2 contains the main parts of the x-ray machines.

(3) Box 3 contains the remainder of the x-ray machine and accessories.

(4) Box 4 contains further accessories and the horizontal Army portable table.

(5) Box 5 contains accessories for the horizontal table.

(6) Box 6 contains a vertical fluoroscope.

(7) Box 7 contains a transformer for the vertical fluoroscope.

(8) Box 8 contains a rotary converter.

(9) Box 9 contains a control box which enables the development of 30 ma. operation.

(10) Box 10 is a lead-lined box containing accessories, as also do boxes 11, 12, and 13.

(14) Box 14 contains 20 square feet of sheet lead. Boxes 15, 16 and 17 contain 30 ma. radiator type Coolidge tubes.

(18) Box 18 contains barium sulphate.

(19) Box 19, a liberal supply of films.

The accessories included in this unit make it possible to operate easily and efficiently without further supplies, as everything is included that a small department may require.

X-ray field units should have the following factors: (1) small cubic foot space; (2) low weight; (3) simplicity of operation; and (4) durability.

The Shearer unit has the simplicity of opera-

tion and durability, but lacks the small cubic space and low weight, and in order to come within the limit of weight and cubic foot space desired by the supply section of the Surgeon General's office, the number of boxes and contents must be reduced a considerable extent. To do this and still maintain the high degree of efficiency is a staggering, but not unsurmountable, problem. A study is being made at this time the results of which will be published at a later date of the outcome of this attempt. The main issue of the problem is the reduction of a field unit of about 5000 pounds in nineteen boxes and crates to about 2500 pounds and ten boxes and crates.

War time field service roentgenology rather reverses the order of things. In peace time the bulk of work is by means of roentgenography, while in war, during actual combat, fluoroscopy and foreign body localization is the main issue.

The war-time training of personnel for roentgenological work is not different from that of peace time, except for the volume, and as during the World War various centers will be designated as training centers.

The war-time service varies from that of the general hospital which is located in the zone of the interior, where the equipment and personnel is the same, peace or war, up through the zone of communication and into the zone of the advance, where in the advanced evacuation or surgical hospital the field unit is the only type of the x-ray equipment seen.

It is not intended that an x-ray field unit will be used farther forward than the advanced evacuation and surgical hospitals, but I hope that as our medical service improves a small portable camion-type unit will be developed for use in the hospital companies of the medical regiment, and I believe that such a unit would give immense aid in the early extraction of foreign bodies and so, perhaps, play a valuable role in helping ward off many of the severe infections with their resultant complications. No x-ray equipment could be used farther forward than the hospital company of the medical regiment.

Roentgenological work is as intensely interesting in the Army as it is in civil life and for those who wish to make the effort, offers a splendid future. I should like to commend the career of the army roentgenologist to the physicians here who are eligible for their consideration and to invite them to consider the opportunities the Army Medical Corps has to offer those who desire this type of specialty. It offers unexcelled opportunity for advancement in the practice of medicine, unhampered by the strife of civil competition and remuneration, ever increasing as the years go by, that compares most favorably with the average earnings of the civil practitioner.

DISCUSSION (*Abstract*)

Dr. Edwin C. Ernst, St. Louis, Mo.—I have nothing to add to the presentation of Dr. Maxwell except further to emphasize the need of designing simple and rugged x-ray apparatus during peace time to cope with and anticipate possible war necessities. When I arrived in France early in May, 1917, with the St. Louis Base Hospital Unit No. 21, the x-ray equipment of the British was inadequate for the needs of the poor, unfortunate wounded even though almost three years had elapsed since war had been declared. The manufacturer's date was marked 1903 on the equipment unit at my disposal. The apparatus consisted of a small coil, gasoline motor generator and a half dozen small batteries two inches square by eight inches high. The maximum energy output was 0.75 to 1 milliampere with a gas tube. Fluoroscopic apparatus was not available, and in fact the British authorities looked with disfavor upon this type of examination. In view of the poorly protected tables in use in many of the evacuation hospitals such an order was most commendable. However, under these working conditions the efficiency of roentgen diagnosis in cooperation with prompt and successful removal of foreign bodies was jeopardized to the extent that only a dozen x-ray plates were made instead of the necessary hundred or more fluoroscopic examinations.

Professor Shearer's unit filled this gap admirably in the larger surgical centers, but at the evacuation hospitals or front line base hospitals, the transportation or portability of such apparatus was perhaps the more important issue. Therefore, I do believe that greater interest should be directed towards this latter phase of roentgenology in war time than almost any other problem.

As soon as the type and character of the work became evident, I improvised a fluoroscopic box on rollers with a 10 cm. shift foot arrangement for triangulation localization, radiographic and fluoroscopic examinations, with complete direct and indirect protection to the x-ray operator. In fact, I made over 17,000 fluoroscopic examinations in the field and have no evidence of either direct or indirect abnormal skin radiation or constitutional effects.

At first the stretchers were merely placed on soap boxes and later a wooden frame was constructed to hold the stretcher. Under these conditions every patient was fluoroscoped from head to foot within a few minutes after his arrival in an ambulance, and if there were present foreign bodies, localizations could be made within a few seconds by shifting the tube under the stretcher a fixed distance of 10 cm. and reading the shift on the metallic fragment shadow on the fluoroscopic screen triangulation scale.

Consequently with this available information the patient was sent either to the operating theater, to the hut for attention later in the day, or transported to Blighty and the South of France for convalescence when the findings excluded a foreign body.

I believe that every consideration should be given the more elaborate x-ray equipment, and Professor Shearer's effort in this direction is most commendable, but the Army should likewise study the problem of small practical units which can be easily transported and are self-contained and rugged. Every protection should be offered the operator, and this can be best accomplished by careful planning in advance at this time rather than under the stress of war conditions.

Dr. Maxwell (closing).—Dr. Ernst has given a common experience with the radiological field equipment when we first went overseas. Simplicity of equipment is what we are trying to obtain. We all realize, particularly since some of us have tried using the Shearer unit, that it is too bulky. A couple of years ago I set up an outfit in Hawaii. This had been assembled at the Army base at Brooklyn, then shipped by boat to San Francisco, unloaded there and put on another boat to Honolulu, unloaded and sent by train to Schofield Barracks without anyone's knowing anything about it. When received it was in excellent shape. I think as far as durability is concerned, Professor Shearer had the right idea and from that standpoint we can pattern after him to good advantage. Elaborate equipment has no place in field x-ray service and the more nearly we can boil our apparatus down to (1) a generator, (2) a transformer with tube attached, and (3) a switch, the more successful our efforts will be.

SODIUM THIOSULPHATE IN DERMATOLOGY*

By JACK W. JONES, A.B., M.D.,
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My experience with sodium thiosulphate has been almost entirely clinical and no attempt has been made to give such laboratory findings as arsenic excreted, in the few case reports to be presented. My interest in the use of this drug was first stimulated by reports of its use in various dermatological conditions by Drs. Throne, Myers, Van Dyck and others. Their results seemed so promising, particularly as they dealt with diseases with which all dermatologists have much trouble, such as chronic eczema and chronic urticaria, that I determined to give it a thorough trial in my own private practice. I also am taking the liberty of quoting opinions of the above mentioned men expressed in articles and personal communications.

Sodium thiosulphate was first introduced into therapy in this country by Drs. Dennie and McBride[1] as a means of relieving certain metallic intoxications, more particularly dermatitis exfoliativa from arsphenamin. About the same time Revaut introduced it into France. Since that time there have been other articles dealing with its use in various dermatological conditions.

Method of Administration.—This drug has been administered by mouth and intravenously. The intravenous method is the one of choice, although sodium thiosulphate is not entirely inactive when given by mouth. The drug is put up in ampoules, both in powder form and in solution. Apparently my results were obtained only when the powder form was used, and the drug made up fresh for each administration. I usually dissolve it in about 25 c. c. of sterile distilled water although 5 c. c. are considered sufficient. The dosage given has been 0.5 gram three times weekly. The only exception to this has been in cases of dermatitis from arsphenamin where usually the dosage has been raised to one gram. Of the several hundred doses given, I have not seen at any time a reaction following administration of the drug by myself. One of my patients, who was being treated by his own physician under my direction complained of chills, fever, and nausea, following each administration. When I treated the same patient, however, he had no reaction in the course of five or six injections. I was unable to account for the reactions, except to surmise that perhaps the water was not freshly distilled.

Use in Syphilis.—Sodium thiosulphate has given its most brilliant results in the treatment of arsphenamin dermatitis and other metallic intoxications. Any one who has had experience in treating a marked case of exfoliative dermatitis from arsphenamin, before this drug became available, can see the almost miraculous results obtained in these cases treated with sodium thiosulphate. Its use has almost eliminated the fear of this condition, and has allowed us the free use of the arsenicals in the treatment of syphilis and other conditions in which they are indicated. If the early symptoms of arsenical dermatitis are noted, it is possible to control the eruption with scarcely a pause in our treatment of the syphilitic. We have all seen patients who apparently have a low tolerance for the arsenicals. We were formerly at a great disadvantage in treating them. They now receive the arsenicals in conjunction with sodium thiosulphate.

Myers, Groehl and Metz[2] are authorities for the statement that sodium thiosulphate shows no deleterious action on the trypanocidal activity of the arsphenamin groups when the two drugs are given simultaneously. These results are corroborated by the clinical observations of other investigators. Myers and McGregor[3] state that

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sodium thiosulphate improves the wellbeing of syphilitic patients who have been resistant to other modes of attack such as spinal drainage, and sedatives. In some instances even the spinal fluid findings are reversed. The period of improvement has not been definitely found, but in many instances this has extended over a period of six months. As an auxiliary treatment of late persistently positive Wassermann fast cases, sodium thiosulphate has proven most satisfactory. Its use is so common in arsenical dermatitis that I will not take up time for case reports of my own.

Use in Eczema.—The use of sodium thiosulphate in eczema in the beginning was based on the association of edema with eczema. Observations by Dennie and McBride[4] and Fordyce and Myers[5] had shown that edema accompanied many cases of dermatitis following the use of arsenicals. Whenever sodium thiosulphate is consistently applied to these cases the edema disappears and the skin becomes normal. Following this lead the use of sodium thiosulphate in eczema was begun. Recently, Dr. Throne,[6] in a personal communication, stated that

"Eczema seems to us to be due to the deposit in the cells of the epidermis and in the walls of the blood vessels of either a metal, chiefly arsenic and probably mercury and lead, or a protein, arsenic probably being the etiological factor in about 30 per cent of all cases. The action of sodium thiosulphate is in removing these from the tissues and causing their elimination through the kidneys."

The following abstracts and case reports are fairly typical of the cases treated in my own office with results obtained:

Case 1.—Dr. H., dentist, came into the office December 27, 1926, with a generalized erythemato-vesicular eruption, worse on the lower extremities, of two years duration. There was a questionable history of arsenic medication. The patient first noticed the eruption on the ankles and feet after wearing a pair of shoes that had been dyed. He had used ointments and lotions without benefit. He was placed on sodium thiosulphate 0.5 grams intravenously three times weekly. Locally he was given calamin zinc lotion to alternate with a lanolin cold cream ointment. On January 4, 1927, the patient showed a marked improvement. The patient lived in North Carolina, and on January 10, 1927, his condition was so much improved that he insisted on returning home against our advice. On January 21, 1927, he returned with a recurrence, and in about the same shape as when he first came to the office. He was again started on sodium thiosulphate as above. On February 5, 1927, he returned home practically clear. His physician was instructed to continue the drug. The patient was in my office in August and stated that he has had practically no trouble since that time.

Case 2.—Mr. S., a fertilizer manufacturer, first came to me January 8, 1925, with a vesicular scaly eruption on the scalp, ears, face and upper extremities of three months' duration, a typical case of eczema. He had been under treatment with another dermatologist during this period, with slight improvement. His general examination by a competent internist revealed nothing of importance. He was started on treatment with x-ray and the usual local applications with varying periods of improvement and recurrences, never being entirely free of the disease. On April 6, 1927, he was started on sodium thiosulphate 0.5 grams intravenously. He had been given only two doses when he called on the 'phone to say that he was practically clear and would not return. He returned August 29, 1927, with a recurrence and was again started on sodium thiosulphate with an immediate response. When last seen September 27, 1927, he was again almost clear.

Case 3.—Mr. A., an engineer, came to my office November 8, 1926, with an erythemato-vesicular eruption on the scalp, face, hands, upper extremities and trunk, which had lasted over fifteen years, a typical eczema. He had been under the treatment of several dermatologists and other physicians and had an x-ray atrophy on the face and hands with numerous keratoses. This man's mental condition was not quite up to par. He was begging me to give him x-ray, as that had given him some relief from the intolerable itching. This was refused and he was started on sodium thiosulphate on March 23, 1927, with Lassar's paste locally. He received three injections and was showing definite improvement when he disappeared. He returned May 9, 1927, with the condition worse than when first seen. He was again started on the above treatment and remained under observation until June 20, 1927, when he had shown a marked improvement and was in very good condition. He came back to the office in September with the statement that he had been in better shape than at any time since the disease began.

Use in Urticaria.—After trying the drug in a few cases of eczema with encouraging results, I determined to try it in some of the cases of chronic urticaria which I was unable to relieve in any other way. Following are two case reports from a number of such cases treated:

Case 1.—Mrs. H., housewife, was first seen in consultation with Dr. R., January 13, 1927, with a generalized urticaria of three weeks duration. The only thing of importance in her past history was an operation five years before for pancreatitis, and a chronic hypertension. There had been no previous attacks of urticaria. The usual advice as to diet and laxatives was given and the patient was not seen any more until February 15, 1927, when she was sent to see me by Dr. G. She still had her urticaria, which had been constantly present, with attacks increasing in severity despite all treatment. She was started on sodium thiosulphate as above February 19, 1927, with an immediate lessening in the severity of the attacks. This was continued until March 26, 1927, with no severe attacks, but a few lesions present at all times. On March 30 the patient was entirely clear. She has had no recurrence since that time.

Case 2.—Miss T., a school girl, was referred to me on February 17, 1927, by Dr. D., an internist. She gave a history of urticaria for two years, with apparently nothing to account for the eruption. She was started on sodium thiosulphate March 15, 1927, as in case above. She was given nine doses, and on April 2

the drug was discontinued with a marked improvement, but not entire disappearance of the lesions. On May 9, 1927, as the lesions were still appearing, although not as bad as before, she was again started on sodium thiosulphate and was given four additional doses, with still more improvement. The drug was then discontinued, and although she still has an occasional attack of urticaria, there is a distinct improvement in the condition.

Although my own experience with sodium thiosulphate has been limited to its use in eczema, urticaria and arsenical intoxications, again quoting from personal communication of Dr. Thorne,

"The drug increases the tolerance for arsenic in pemphigus and Duhring's disease. It also seems to make it more active. This is done by preventing its deposit in the tissues in an insoluble form. In cases of pemphigus where arsenic seems to have lost its power to control the development of new lesions and where the old ones do not heal, I have seen sodium thiosulphate work remarkably well. In the reactions seen in the treatment of lupus erythematosis with the gold preparations, thiosulphate is a specific." He attributes the failure of thiosulphate to work in the above conditions, or the loss of power during treatment as is seen at times in eczema and exfoliative dermatitis, as probably due to vagus overstimulation. "When this condition arises it is advisable to stop the thiosulphate for a while and give calcium, as this stimulates the sympathetic and makes the thiosulphate active again."

In the blood, after a heavy metal poisoning, are observed a high sugar content and a comparatively low chlorid. As the condition clears up under thiosulphate these become normal. This blood examination is valuable in cases where these metals are used, and perverted carbohydrate and chlorid metabolism is an indication, even before the development of any clinical symptoms, that there is a retention of the metal in the system.

CONCLUSION

My primary object in investigating the use of sodium thiosulphate was to determine if I could not become more efficient in the therapy of two diseases which have caused me the greatest trouble in my own private practice: chronic eczema and chronic urticaria. Although we must guard against becoming too enthusiastic about any new procedure until it stands the test of time, my feeling toward this treatment at the present time is optimistic. While my experience up to the present time has been rather limited, as I have been using the drug for approximately twelve months, and while my results have not been 100 per cent good by any means, I can safely say that I have noticed distinct improvement in each case treated with sodium thiosulphate where the drug was indicated. Sodium thiosulphate, in my opinion, is a distinct addition to our therapeutic armamentarium in chronic eczema and urticaria. It would also seem to be of value in other diseases associated with metallic intoxications.

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DISCUSSION (*Abstract*)

Dr. Isaac R. Pels, Baltimore, Md.—Before we use this drug in cases such as were mentioned, it would be a very satisfactory thing if we could conclude, either by actual or presumptive evidence, that a metal was the etiological factor. In the method proposed by Osborne for determining the presence of particles of arsenic in the skin we may have some clue regarding the rationale of treatment.

The cause of dermatitis may be allergic rather than from a metal, and for this reason we have to consider that some improvement in these cases would follow natural rest and lotions, as was mentioned by Dr. Jones. Cases of urticaria do occasionally improve with time: there is sometimes a spontaneous cure.

In pemphigus of Duhring's disease again I suggest caution.

Many drugs not advocated for these two diseases have been used; for instance, mercurochrome and iodin. We should consider two factors: (1) the vicious circle which is produced; and (2) the psychic reaction to the actual treatment. We feel that these two factors frequently play a part in any therapy of this kind.

Dr. Thomas W. Murrell, Richmond, Va.—I have obtained recovery from acute dermatitis of face and hands by the empirical use of sodium thiosulphate in the case of a paperhanger.

Dr. Bedford Shelmire, Dallas, Tex.—Certainly all of us would welcome a cure for eczema. At the present time my experience with the drug in the treatment of this disease is too limited to allow me to voice an opinion. Three cases did not seem to be benefited by it. As yet I have not been convinced that sodium thiosulphate is of value in arsphenamin dermatitis. The original enthusiasm for the drug in arsphenamin intoxication has waned considerably after a thorough trial.

Dr. W. H. Mook, St. Louis, Mo.—We have always taught that a patient who receives arsphenamin or any of the allied products and develops a skin rash should never be given any more arsenic, and that if arsenic is persisted in many times a fatal result may occur. We thought our results at first from sodium thiosulphate were most excellent, but later we found cases which did not respond. In most instances, however, improvement to a cure has been noted. If we do not get results within the first week to ten days of daily treatment we generally discontinue the use of sodium thiosulphate.

Dr. J. C. Michael, Houston, Tex.—The idea that this drug acts in arsphenamin dermatitis by combining with the arsenic in the tissue to form a soluble compound has been shown to be erroneous. Sodium thiosulphate acts upon the autonomic nervous system. Under ordinary conditions of arsphenamin administration there is regulation through the autonomic nervous system of the tissue content of arsenic; when the control goes awry, there is a concentration of arsenic in the tissues leading to dermatitis. Sodium thiosulphate may restore the regulatory function of the sympathetic system, but if the damage has been too great it will not have a beneficial effect. Hence it seems that unless sodium thiosulphate produces improvement in a week or so, further administration of it is useless. The effect of the drug upon allergic conditions, such as the essayist reports, is probably also explained by its action upon the autonomic system. To a certain extent I can corroborate its therapeutic usefulness in allergic skin disorders, though in my hands beneficial results have been seen only occasionally.

Dr. C. Augustus Simpson, Washington, D. C.—I would like to report sodium thiosulphate as a failure as a prophylactic. We have also tried to clear up three cases of sulphur dermatitis with it without any results. Many children have chronic arsenic poisoning and dermatitis (eczema) resulting from the arsenic in the glucose of the cheaper grades of candy.

Dr. Howard King, Nashville, Tenn.—I would like to offer Dr. Jones a little encouragement. For the last two years Dr. Hamilton and I have been doing some work as Dr. Jones has been doing. In cases of eczema in which we suspected arsenic poison we had no one who could make these tests to our satisfaction. However, the cases were in men who raise tobacco and use insecticides, in one case a wall paper hanger. We have seen some very good results with sodium thiosulphate in a few cases. I have two cases of chronic urticaria, both of which made wonderful improvement. Nothing else had done them any good.

I saw eleven cases of arsenic dermatitis last year, most of which were extremely severe. Certainly, it seems to me that they do wonderfully better than cases I have seen before.

Dr. Everett S. Lain, Oklahoma City, Okla.—Some supposed new remedies are really old ones. I had to compete with "advertising quacks" in various branches of medicine during the early years in my State. One of the most prominent is a so-called skin specialist, who sends out his advertising matter from a place in Missouri. He specializes upon eczema and sends every case of self-diagnosed eczema a powder to put on dry or to be dissolved in water and apply. Some of the cases, which are really weeping eczema, have temporarily improved under the treatment. I obtained some of his powder and had it analyzed. It proved to be nothing more than sodium thiosulphate.

Dr. L. F. Ferguson, Greenwood, Miss.—We have been treating pellagra with sodium thiosulphate with good results. It yields nicely to the treatment.

A man who took bichlorid of mercury to commit suicide was carried to the hospital unconscious. We gave him the treatment. His mind cleared up and he recovered.

Dr. Howard Hailey, Atlanta, Ga.—After Dr. Throne's article I became interested in sodium thiosulphate. Use of the drug in several cases convinced me that it was inferior to calcium lactate in eczema and urticaria.

Concerning the non-inhibitory action of sodium thiosulphate against the arsphenamins, I wish to state that Drs. Upchurch and Brown, of Atlanta, treated a series of cases of syphilis in which sodium thiosulphate 1 gram three times daily by mouth was given simultaneously with diarsenol. They report "as the clinical symptoms and signs progressed we concluded the sodium thiosulphate neutralized the anti-luetic treatment."

Dr. Sidney E. Bray, Savannah, Ga.—Nothing has been said about possible reactions from sodium thiosulphate intravenously.

Dr. C. N. Frasier (*J.A.M.A.*, February 19, 1927) reports four cases of purpuric vesiculobullous dermatitis following intravenous injection of this drug.

Dr. Pels' remarks on the psychological element in some cases of urticaria recalls a casein my practice. A man, age 50 years, suffered with urticaria for two years, the attacks always appearing at 7:00 p. m. The sudden illness of his wife, which necessitated a surgical operation, cured the husband.

Dr. C. F. Lehmann, San Antonio, Tex.—I suppose some of you have had this experience with sodium thiosulphate in treating exfoliative dermatitis. After a few doses there occurs an edema that obliterates the veins, making intravenous medication difficult, if not impossible. At this time the administration of calcium by mouth is quite helpful. I have on more than one occasion seen the edema subside soon after its administration. This edema, which is most probably due to salt retention, is more liable to occur if the patient has nephritis. This treatment was forcibly impressed upon me by a case of arsenical exfoliative dermatitis in a chronic nephritic. After the edema appeared calcium was administered until it subsided. Thereafter the thiosulphate was used more carefully and the patient survived. Possibly the calcium ion has as much to do with the fluid content of tissue as the sodium ion, and one is the physical and biological antithesis of the other. Also, behind this may be the effect of each on the autonomic nervous system.

Dr. Chas. O. King, Birmingham, Ala.—It was my good fortune to assist Drs. Throne and Myers in this experimental work with sodium thiosulphate in treating the different eczemas. The work extended over a period of about four months' time. Urinary examinations before administering sodium thiosulphate showed no arsenic content. After a couple of doses arsenic appeared and a gradual increase was found from week to week. In some cases the results were excellent and more improvement was found from this treatment in the cases that showed a gradual increase in the elimination of arsenic in the urine.

One case, a sailor whose daily work was cleaning the brass on a vessel, had a severe eczema of the hands, palms especially involved, and made a complete recovery with sodium thiosulphate with no local applications whatsoever. The results as a whole were good.

Dr. Jones (closing).—There are one or two things which I wish to stress: (1) the use of a fresh preparation of sodium thiosulphate. The drug should be made up fresh for each treatment in freshly distilled water. (2) I would like to stress the selection of cases for such treatment.

I have had a number of failures, but my successes have been particularly pleasing, in that they have usually been with cases whose treatment before had been unsatisfactory.

As I stated in the beginning, my work with sodium thiosulphate has been purely clinical. "The proof of the pudding is in the eating." Therefore as long as I am getting results with it I shall continue to use it.

TREATMENT OF BRONCHIAL ASTHMA*

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The accumulated knowledge of the past and the extensive investigations reported in the current medical literature, fail to reveal the primary or predisposing cause of the bronchial asthma syndrome. This factor has been regarded as a disturbance of the autonomous nervous system, of the endocrins, and of metabolism. The latest conception associates bronchial asthma with allergy. The predisposing factors furnish the latent or preliminary condition for the attacks of asthma; the presence of the exciting factor is necessary to precipitate such attacks. In 80 per cent of the cases reported since careful observations have been made of the allergic phenomena as instituted by I. Chandler Walker, Robert A. Cooke, A. F. Coca, and others, experimental evidence has shown the exciting factors to be: food proteins, bacterial proteins, animal emanations, pollens, and drugs.

If all of the exciting agents are to be considered, an exhaustive history of the patient is of fundamental importance. The habits, occupation, environment, food, and previous illnesses may reveal the probable cause, and limit an endless search of all atopens. The skin tests to be made should be determined by this information. Usually less than one hundred are sufficient. Seasonal asthma is due to pollens in the majority of cases. When the attacks are perennial, many factors are to be considered: as, pet animals, foods, household furnishings, cosmetics, dust, bacteria, foci of infection, and upper respiratory obstruction. It is important to ascertain the age of onset; for, the earlier in life the attacks begin, the more likely it is that they are atopic. The occupation may necessitate contact with the causative agent: as, millers and bakers with grain and cereal dust, farmers and dairymen with cattle and horses, and poultrymen with feathers. A family history of asthma, hay fever, and urticaria in the antecedents is of diagnostic significance. The past history is suggestive when hay fever and eczema of infancy have preceded the attacks. A complete physical examination is essential to eliminate pulmonary tuberculosis, cardiac and renal dyspnea, mediastinal neoplasms, aneurysms, and other conditions which may simulate bronchial asthma. The nose and throat require careful examination in all cases. The gastro-intestinal tract and genito-urinary organs should be examined if there are symptoms. Roentgen-ray films of the chest should be taken. When the case is obscure, blood tests should be made for hyperglycemia, nitrogen retention, low calcium content, and lues.

The relative incidence of the protein sensitive groups is shown in *Table 1.*

TABLE 1.—PRIMARY EXCITING FACTORS

Allergens or Atopens	Per Cent
Pollens	11 to 58
Animal emanations	16 to 58
Bacterial proteins	10 to 11
Food proteins	10 to 40
Miscellaneous	10 to 63

(2763 cases.)

For convenience, the treatment is considered under the following headings; general measures, elimination and hyposensitization, vaccine, surgery, and drugs.

General measures are instituted to increase the positive stock of health, when the tendency to asthmatic attacks is discovered. Specific instructions are given in regard to the clothing, bedroom furnishings, sunlight, exercise, food, occupation, residence, automobile trips, mowing the lawn, and pet animals. The state of nutrition, the anemia, and the evidence of endocrin dyscrasia are to receive appropriate treatment. The entire organism of the individual is considered in the effort to improve the general health. The intelligent cooperation of the patient and the family is necessary in maintaining these cases free of symptoms.

Treatment by elimination and hyposensitization depends largely on the diagnosis of the cause. The association of bronchial asthma with allergy offered so much of interest and of promise that a new method was instituted, based on the intradermal or cutaneous test. Intense enthusiasm was aroused in medical circles by some of the early successes; then came a period of disappointment, due to a realization of the limitations and conditions modifying the allergic phenomena. The cutaneous tests were found misleading, and many good clinicians discarded them, failing to recognize their clinical significance. James S. McLaughlin and Harry L. Alexander have recently demonstrated the relative value of the cutaneous reaction. Allergy manifests itself by edema and involuntary mus-

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cle-spasm of one or more organs. Those organs known to be affected are the skin, the respiratory and gastro-intestinal tracts. The phenomenon is a localized reaction. The substance producing an attack of bronchial asthma may or may not be a skin allergen; the cutaneous tests are not all a specific demonstration of respiratory atopens, and the skin will be found hypersensitive in only 50 per cent of allergic persons. As the positive reactions are of clinical importance when interpreted intelligently, the cutaneous tests should be performed with a number of common pollens, animal epidermals, food proteins, and bacterial proteins. The ophthalmic and nasal tests may be made with certain substance when the epidermal cells are not sufficiently sensitive. Dietary manipulations may be necessary. This may be done by omitting certain foods from the diet; then by adding one article of food every three days, the suspected proteins are either incriminated or found to be harmless. Natural contact with the offending substance as determined from the history is the most important diagnostic information.

The discovery of the probable and known exciting factors is the basis upon which proper advice and treatment can be given. The method of choice is elimination, whenever it is possible to eliminate all extrinsic atopens. Great variety in the diet is prohibited, when food proteins are known to be the cause. Eliminate the known offending foods from the diet list prepared for the patient, and include articles containing a sufficient quantity of the vitamins. A residence above the surrounding low grounds, frequent mowing of the grasses on the premises, and restricting travel during certain seasons, eliminates pollens to a sufficient degree. A non-allergic sleeping chamber, furnished and cleaned similarly to a hospital room, eliminates house dust. Animal contact can be avoided without any inconvenience, especially when it is due to furs, rugs, feathers, and pet animals. The importance of elimination should be stressed repeatedly to the patient.

Complete elimination of every atopen can be done in some instances only at a great inconvenience or economic loss. Hyposensitization may be more feasible, or a combination of elimination and hyposensitization may be necessary. Hyposensitization is a method of rendering a patient less sensitive to the exciting factors. The extracts of the atopens must be standardized, so that small amounts will give a weak positive reaction. The initial dose is fixed arbitrarily, depending on the potency of the atopen and the sensitivity of the patient. An ideal initial dose produces no symptoms except a local reaction at the site of injection. The increase in dosage and the interval between injections depends on the individual, the atopen, and the symptoms produced. Treatment is continued until complete clinical relief is obtained. Severe and dangerous reactions should be avoided by conservative doses and extreme care in handling the extracts.

Treatment with bacterial vaccines and foreign protein demands consideration in the cases of bacterial origin. This group is limited to individuals who are sensitized to bacteria or their products, and comprises 10 per cent of the cases of bronchial asthma. The relief obtained in 50 to 60 per cent of the patients treated with autogenous vaccines can be explained on the basis of an increased immunity and hyposensitization.

Stock vaccines containing the protein atopen should give results in bacterial atopy comparable to pollen, animal, and food atopy. The initial dose is small, fifty to one hundred million, depending on the test reaction. Subsequent doses are carefully increased, in a proportion depending on the local reaction and constitutional symptoms; six to ten inoculations at intervals of five to seven days are considered sufficient. If there is no improvement, foreign protein in the form of sterile milk may be given, from which treatment good results have been observed in a few cases. When satisfactory results are not obtained by these measures, an autogenous vaccine should be prepared. Eiman has isolated two new atopens: a secretion filtrate and a soluble toxin. Wilmer has combined these with the bacterins in the treatment of a small series of cases with good results. Secretion from the bronchi, sinuses, and tonsils, or mucopurulent material from fresh sputum is obtained. By approved bacteriological methods, various types of bacteria are isolated in pure culture. The cultures are sterilized, standardized, and put up in convenient containers. Intradermal tests are made, and the vaccines which react positively are used for treatment. The administration of the vaccine does not differ from the method used in other infections, except that the initial dose is small, and that the treatment must be given cautiously.

The use of vaccines in infections due to the streptococcus, staphylococcus, pneumococcus, micrococcus catarrhalis, and *Bacillus mucosus capsulatus* has been regarded with skepticism, but the excellent results obtained in bronchial asthma justify its use.

The surgical treatment of bronchial asthma appears to be limited to the removal of certain foci of infection which have reacted reflexly to produce the broncho-spasm. The greatest benefit derived from these measures is due to an improvement in the general condition.

In the midst of an acute paroxysm, palliative treatment is imperative. Epinephrin chloride, 1 to 1000, in doses of 0.2 to 0.6 c. c., is still the most rapid and efficient drug in controlling asthmatic attacks, giving prompt relief to the distressing dyspnea in more than 90 per cent of the cases. The objections to the use of the drug are that the effects are of short duration, one to four hours; that it can not be given orally; and that disagreeable symptoms are produced by large doses. Epinephrin applied to the mucous membranes has rarely been of any considerable value.

The most valuable drug introduced recently for the relief of the attacks is ephedrin. Qualitatively, it has the same physiological effects on secretion and the involuntary muscles as epinephrin. Quantitatively, it has the advantage of being more stable, of being given orally, and of having effects which last from three to seven hours. Ephedrin sulphate may be given by mouth in doses of one-half to three quarter grains (0.032 to 0.05 Gm.) every six hours. Children should receive proportionately smaller amounts. A solution of ephedrin used as a spray gives some degree of relief in a large percentage of cases. Distressing symptoms produced by an overdose are, tremor, cardiac palpitation, nausea, sleeplessness, sweating, and bladder irritation. A small initial dose should be administered.

The iodides are of value in the chronic infectious type, especially when severe coughing paroxysms intensify the asthmatic attacks. Sodium iodide in doses of 10 to 30 grains (0.65 to 2.0 Gm.) three times daily should be given for three months. If definite benefit results, it may be repeated at intervals for one to two years.

To the patients suspected or known to have calcium deficiency, calcium lactate or the chloride in five to twenty grain doses (0.32 to 1.3 Gm.) three times daily is given. Occasionally marked subjective relief has followed the use of calcium. Exposure to the ultra-violet ray or sunlight aids calcium metabolism, and is beneficial in improving the general health.

SUMMARY

The present treatment of bronchial asthma is far from satisfactory. However, it represents a marked advance over previous methods. Relief is obtained in a large per cent of cases for a variable length of time. The results are shown in *Table 2*.

TABLE 2.—THE RESULTS OF THE VARIOUS METHODS OF TREATMENT

	Elimination and Hyposensitization	Bacterial Vaccines and Foreign Proteins	Drugs
Relieved	20 to 80%	7 to 51%	55 to 78%
Improved	21 to 41%	22 to 39%	10 to 18%
Slightly improved	5 to 23%	5 to 10%	
Not Improved	4 to 14%	10 to 41%	22 to 27%
Number of Cases	2489	334	232

The success of any method of treatment depends on the degree of hypersensitiveness, both qualitative and quantitative, the relative amount of the atopens in the environment, climatic conditions, the altitude, and the geographic location.

The degree of sensitivity varies in different individuals and in the same individual at short intervals. The tolerance may vary so rapidly that a negative test may be followed by a positive test within ten days or vice versa. This explains the fact that the attacks may vary in severity.

A natural tolerance may be acquired over a period of years, which results in freedom from subsequent attacks. Many children are cured spontaneously in this manner.

A certain number of cases develop permanent organic changes; as, chronic emphysema, the barrel-shaped hyperresonant chest, with prolonged high-pitched breathing. Frequently these complications are followed by chronic infection. A few plates illustrating the different stages will be shown.

CONCLUSION

(1) The history is the most important information in the diagnosis.

(2) A positive cutaneous test demonstrates allergy.

(3) Cutaneous tests are not specific for the atopens.

(4) Elimination of the exciting agents is the method of choice.

(5) Economic factors make a combination of hyposensitization and elimination necessary in many cases.

(6) Vaccines and foreign proteins are recommended in the infectious group.

(7) Epinephrin chloride gives prompt relief in the midst of an acute attack.

(8) Ephedrin is effective in relieving the bronchial spasm and in preventing a recurrence.

(9) The general health must be maintained by appropriate measures.

(10) It is apparent that no absolute cure has been discovered, and that a constant supervision of the atopic person is essential to prevent recurrence of the asthmatic attacks.

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DISCUSSION.

Dr. James E. Paullin, Atlanta, Ga.—We must adopt the habit of not looking on bronchial asthma as a disease. It is a symptom, a reaction from some other existing cause. At the present time the exciting causes of bronchial asthma, as has been mentioned by Dr. Long, can be divided into two distinct groups: the extrinsic causes such as pollens, dust, ingestion of various food products. Bronchial asthma may be from extrinsic causes introduced through the skin or by inoculation. It is in this group that progress has been made in the past few years, and because of the enthusiasm over this many of us are inclined to forget the intrinsic causes of the disease. Particularly are we liable to overlook the foci of infection which are related more or less to the paranasal sinuses, nasal polypi and certain bacterial infections resulting in chronic bronchitis. These symptoms as manifested by what we know and speak of as bronchial asthma require for their relief a very careful study of the patient.

The results of treatment are not so satisfactory as we would hope. I think a conservative estimate would be that from 60 to 65 per cent of patients with bronchial asthma obtain a moderate amount of relief. The failure of relief in a considerable number of these patients is due to the fact that the existence of this symptom complex over a period of time has caused very definite changes to take place within the lung itself. The development of a chronic bronchitis, or an emphysema, mitigates against successful results in many of our forms of therapy.

Dr. I. S. Kahn, San Antonio, Texas.—Bronchial asthma can be placed in an identical classification with diabetes as to results of treatment. The word "cure" should not be used. The chronic asthmatic cannot be promised more than a probability that a considerable amount of symptomatic relief will be given in about 80 per cent of cases, a percentage which will increase with increasing knowledge. Diagnostic skin tests properly done will almost certainly give an etiologic diagnosis. Skin tests which are not based on previous environmental considerations and confirmed by experimental contacts are worthless. Desensitization treatment is not, of course, invariably successful even in the hands of experts, and will certainly be a failure if not properly done. However, each succeeding year every experienced worker in this field finds his percentage of successes constantly increasing and is much encouraged thereby. The pessimistic attitude regarding bronchial asthma among the medical profession generally is not justified, as there are about a dozen clinics where decidedly satisfactory results are secured. Now the idea that all a man has to do is to secure a set of testing and treatment material and that he can then go on and treat these cases successfully is ridiculous. It is just the same as if a man were to get a supply of instruments and material to do Wassermann work without any particular training or study on the subject. But if the man who wishes to do this work will spend sufficient time learning botany and how to use his material, he will be astonished at the results which he can secure.

Dr. W. R. Houston, Augusta, Ga.—Asthma treatments will fail in a great number of cases. The cases even that come from distinguished clinics, having been given complete relief, not infrequently recur. The history of asthma is that it is apt to run a severe course for a time, get well for a long time, perhaps for many years and later recur.

When the attack of asthma is over and the lungs are stretched and full of asthmatic wheezes the patient should be kept still and at rest in bed if possible until the lungs have resumed their normal size. A very important duty of the physician is to watch the stretching of the lung and to see that a young person does not undertake exercise of any sort until the lungs have come back to their correct size. By this means many of the hopeless and distressing conditions of intractable emphysema may be avoided.

Dr. Long (closing.)—Bronchial asthma is a chronic disorder and the task of finding all of the exciting factors and eliminating them is an arduous one. The treatment should be continued for a period of years to prevent the occurrence of permanent changes in the lungs.

TRIGEMINAL NEURALGIA AND BRAIN TUMOR*

By R. E. SEMMES, M.D.,
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The first two patients that I should like to show to you, Mrs. H. and Mrs. G., were suffering with trigeminal neuralgia major involving the second and the third divisions. Upon both we did a subtotal resection of the sensory root, preserving the motor root and cutting about three-fourths of the sensory root. We regard this type of procedure as ideal where the second and third, or only the second divisions are involved.

There was nothing unusual in the history of either case. Typically, and I might say almost invariably, the condition starts in a woman or man passed middle life. The pain is very intense coming on suddenly, disappearing suddenly, leaving the patient comfortable between attacks. The pain is limited to one or more divisions of the fifth nerve on one side. It is brought on by touching a certain spot, "the trigger area," talking, chewing or even a gust of wind striking the face. Examination of the parts is negative even for areas of anesthesia.

When asked certain questions, patients with true trigeminal neuralgia respond with standard replies. When asked if the pain lasts long, they say, "No. If it did it would kill me." When asked if they object to the anesthesia of the face which will follow operation or injection, they reply: "I don't care if it paralyzes my face." When one attempts to explain that there is a very small but definite risk, they interrupt with, "I had rather be dead than have the pain."

The history alone usually cinches the diagnosis. You may see by testing the muscles of mastication that both of these patients are free from motor disturbance, that the straight incision in the temporal region is entirely covered by hair, and there is no disfiguring atrophy.

In case the third division only is involved, we think that it should be injected with alcohol and the intra-orbital or supra-orbital nerves should be injected when the "trigger area" lies within their distribution. However, most of the patients whom we see have already worn out this type of treatment and no longer get relief from it, and many of them have had peripheral nerve avulsion and are looking for permanent relief.

The original operative procedure for trigeminal neuralgia was to remove all or part of the ganglion; the next step was the "physiological extirpation of the ganglion" by cutting its root, which had many advantages. The next refinement was to preserve the motor root, which was identified first by an electrode and later by direct anatomical dissection, its size and course being characteristic. The latest development has been subtotal resection of the sensory root where the first division was not involved, thus preserving sensation in the eye. In sparing the upper sensory roots we realize that there is a possibility of the neuralgia extending to this part, requiring a reopening and severance of the remaining sensory fibers. In the seven cases in which we have spared the upper fibers, there has been no recurrence and in discussing this point with several other neurological surgeons who are doing the subtotal resection, I understand that their experience has been the same. We, therefore, consider that this risk is largely theoretical, and even should an occasional incision have to be reopened it would not be a serious objection, because many of these patients are too old or too careless to take proper care of the anesthetic eye no matter how carefully and how repeatedly the technic has been explained to them. The nature of the occupation of others, such as railroad employes, make it difficult if not impossible to protect the eye.

Trigeminal neuralgia is the most satisfactory condition with which the neuro-surgeon has to deal, and the only one that justifies promising the patient certain and permanent cure by a procedure which has been almost without mortality, in spite of the general impression to the contrary.

Cases 3 and 4.—The next two cases are examples of large cystic gliomas of the cerebellum with complete recovery of the cerebellar function after removal. For a long time it has been recognized that gliomas were of different types, varying greatly in gross and microscopic appearance and in clinical course. Some of these tumors grow rapidly, infiltrating the brain, recur promptly after removal and are quickly fatal. Others grow slowly, recur only after many years and cause death ten or fifteen years later, or perhaps do not recur at all. Bailey and Cushing have recently classified the gliomas on a histogenetic basis, upon which treatment and prognosis can be worked out.

Each of these patients, Doris S. and Mr. B., had a large astrocytoma, according to the new classification, which had undergone cystic degeneration, as they com-

*Clinic, Clinic Session, Southern Medical Association, Twenty-First Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

monly do. Both were suffering with headache, vomiting, dimness of vision, staggering gait and the other classical signs of tumor of the left cerebellar lobe with secondary internal hydrocephalus. Mr. B. had a subtentorial exploration and decompression thirteen years ago; a partial removal of the tumor six years later, a thorough but incomplete removal three years ago, and we hope a complete removal two weeks ago. He is a farmer and has made a crop each year in spite of the recurrence of the tumor and symptoms and repeated operations.

You will observe that both patients have a normal gait, a negative Romberg and can perform the finger-nose and finger-finger tests perfectly. The tumor mass removed in each case, as you may see, was quite large and with the included cysts filled about half of the subtentorial space. We explain the return of cerebellar function by assuming that the nuclei and peduncle were pressed aside, but not destroyed.

We are showing these two examples of a favorable type of glioma in order that the general profession may not be influenced by the unfavorable course of the more malignant types to abandon patients with glioma to die, or seek temporary relief by decompression only, when many of them may be cured or may live comfortable, useful lives for ten or twenty years by removal of the tumor.

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PUBLIC HEALTH ADMINISTRATION IN VIRGINIA

By JAMES A. TOBEY, LL.B., Dr. P. H.
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Virginia was the first state south of the Mason and Dixon line to establish a state board of health, and the third in the country to create such an agency. The Virginia board was set up in 1872 and was preceded only by those in Massachusetts and California, though Minnesota also organized a board in 1872.

HISTORY AND DEVELOPMENT[1]

As early as 1631 or 1632 the Colony of Virginia passed an act for the collection of vital statistics, but at the time this act was a legal rather than a public health measure. Not until 1853 was a law adopted to compel the registration of births and deaths, with data as to the nature of the birth and the cause of death, and to require records to be kept by physicians. In 1639 a law to regulate the practice of medicine was promulgated, but the first public health legislation was apparently an act of 1777 (Chapter 5), which required persons having smallpox or other contagious disease to leave the road on the approach of other persons and to warn them with the biblical injunction of "Unclean, unclean." A state vaccine agent was appointed in Richmond in 1814, though the office was abolished in 1821, to be revived in 1832. The duties of this agent consisted of the free distribution of vaccine material to the citizens of the state, a function which was continued until 1890, when the office was finally abolished. Laws relating to vaccination were passed in 1860, 1882 and 1894. The first act permitted free vaccinations by overseers of the poor, the second authorized municipal authorities to require vaccination, and the third made vaccination a prerequisite to school attendance.

THE FIRST BOARD OF HEALTH

In 1872 the legislature created a State Board of Health and Vital Statistics. It was made up of seven physicians appointed by the governor for four year terms. The duties of this board were stated to be: to communicate with local boards of health,[2] with hospitals, asylums, and public institutions; to make sanitary investigations and inquiries respecting the causes of disease; to devise a scheme whereby medical and vital statistics might be obtained; to report as to the effect of intoxicating liquor as a beverage upon the industry, happiness, health and lives of the citizens of the state. This early law unfortunately required that "the board of health shall not in any way be a charge upon the state." It was not, moreover, given an appropriation until 1896, when $2000 was allotted to pay the salary of a permanent secretary, to reside in Richmond. At this time, the Board was also given the power to adopt rules and regulations to prevent the spread of disease.

In 1900 the State Medical Society was authorized by law to nominate the members of the state board of health, though the governor continued to make the appointments. This same act likewise provided for the appointment of county boards of health by the judges of the various counties. These boards were required to consist of three physicians, recommended by the county medical association, if there was one, and of the clerk of the court and the chairman of the board of county supervisors, as ex-officio members. In this same year (1900) the State Board of Agriculture was charged with the enforcement of pure food laws.

THE DEPARTMENT OF PUBLIC HEALTH

A Department of Public Health, to supersede the former board of health, was created in 1908

by the General Assembly. This department consisted of a board of twelve physicians appointed for four year terms by the governor, one from each congressional district, with two additional members from the City of Richmond, and a health commissioner, who was not a member of the board. The health commissioner, appointed for four years by the governor, was required to be versed in bacteriology and sanitary science, and otherwise fitted and equipped to execute the duties incumbent upon him by law. The powers given to the department were largely educational, though the State Board of Health was authorized to exercise the authority and perform the duties of a local board or health officer in any city, town, or county which omitted to appoint such a local health authority. Laboratory work by the state board was authorized in this law and accordingly was undertaken. An appropriation for a tuberculosis sanatorium for white people was also made to be administered by the State Board of Health. $40,000.00 per year was the total appropriation for all purposes, sanatorium included.

Additional and more extensive powers were given to the department in 1910 when the Legislature provided that the State Board of Health could adopt, promulgate, and enforce reasonable rules and regulations for the protection of the public health. In this same year a State tuberculosis sanatorium was established near Roanoke. Two years later the State Board of Health was directed to have charge of the regulation of births and deaths and the health commissioner was designated as State Registrar of Vital Statistics. The state was admitted to the Federal death registration area in 1913 and to the birth registration area in 1917.

In the survey of state health work made by Dr. C. V. Chapin in 1914,[3] Virginia was awarded a score of 397 points out of a possible 1000, ranking thirteenth among the 48 states. Dr. Chapin's report said that Virginia "has, during the last few years, shown a remarkable sanitary development."[4] He recommended, however, better local sanitary organization and more child hygiene activities.

In 1916, the State Board of Health was increased by the addition of two members from the state at large, and one of these was required to be a member of the state dental association.[5] In 1918, the salary of the health commissioner was increased from $3500 a year to $4000.[6] In 1920 the law concerning the State Board of Health was amended so that only five of the fourteen were members of the Medical Society of Virginia.[7] Finally, in 1924, the number of physicians was further reduced to two and a board of only seven was provided for, one representative from the dental profession being continued.[8]

PRESENT ARRANGEMENT

The present state health department of Virginia consists of a board of seven and the health commissioner. The board is made up of four physicians, one dentist, and two laymen (one a woman). The law requires that one member be chosen from each of the five grand divisions of the state, namely, Tidewater, Middle Virginia, Piedmont, Valley and Southwest, and two from the state at large. The terms of office are seven years, one term expiring each year.

The health commissioner is a physician, the present incumbent having held office since 1908. The health commissioner is empowered by law to appoint, with the approval of the board, such clerical and other assistants as are necessary. The salaries of such assistants are fixed by the board. All such employes are responsible to the commissioner and may be removed by him for cause. There is an assistant health commissioner, who is also a physician. The department has a total personnel of 97, of whom 24 are scientific and 73 clerical, mechanical and other workers. The total appropriation to the department for the fiscal year ending February 28, 1928, is $567,897 of which $365,330 was for tuberculosis sanatoria.

POWERS OF THE DEPARTMENT

According to the law of 1910 (Chapter 179), which is still in force, the state board of health has the power:

"to make, adopt, promulgate, and enforce reasonable rules and regulations from time to time requiring and providing for the thorough sanitation and disinfection of all passenger cars, sleeping cars, steamboats and other vehicles of transportation in this state, and also of all convict camps, penitentiaries, jails, hotels, schools and other places used by or open to the public; to provide for the care, segregation and isolation of persons having, or suspected of having, any communicable, contagious, or infectious disease; to regulate the method of disposition of garbage or sewerage and any like refuse matter in or near any incorporated town, city, or unincorporated town or village of this State; to provide for the thorough investigation and study of the causes of all diseases, epidemics and otherwise in this State, and the means for the prevention of contagious disease, and the publication and distribution of such information as may contribute to the preservation of the public health, and the prevention of disease; to make separate orders and rules to meet any emergency, not provided for by general rules and regulation, for the purpose of

suppressing nuisances dangerous to the public health and communicable, contagious and infectious diseases and other dangers to the public life and health; provided, however, that nothing herein contained shall be construed as in any wise preventing or restricting any person so segregated or isolated from choosing his own method of treatment, or in anywise limiting any diseased person in his right to choose or select whatever method or mode of treatment he may believe to be the most efficacious in the cure of his ailment; provided, however, that nothing herein contained shall be construed as in anywise limiting any duty, power or powers now possessed by or heretofore granted to the State Board of Health by the statutes of this State, or as affecting, modifying or repealing any rule or regulations heretofore adopted by said board."

The board is also authorized to prepare and promulgate, from time to time, a list of diseases considered as infectious, contagious, communicable or dangerous.[10] Control over the registration of vital statistics is vested by law in the board,[11] as is also supervision of the sanitation of public water supplies,[12] and of the shellfish industry.[13] The board may cause the removal of patients having communicable diseases to isolation hospitals.[14] With the State Board of Education it has certain concurrent jurisdiction over school hygiene.[15] As previously set forth, the State Board of Health may take charge of local health work in emergencies.[16]

ADMINISTRATIVE ORGANIZATION

Under the direction of the state health commissioner, there are now the following bureaus:

- Administration
- Rural Health Work
- Sanitary Engineering
  - Shellfish Sanitation
- Epidemiology
- Malaria Control
- Laboratory
- Child Health
  - Public Health Nursing
  - Mouth Hygiene
  - Correspondence Courses in school inspection for teachers, for mothers and midwife instruction
- Vital Statistics
- Tuberculosis Out-Patient Service
- Social Hygiene
- Publicity
- Three tuberculosis sanatoria with 700 beds—Catawba Sanatorium, Blue Ridge Sanatorium, and Piedmont Sanatorium (colored).

The assistant health commissioner supervises rural health activities, including malaria control and social hygiene. Each of the other bureaus is in charge of a full-time director. The functions of each are as follows:

Rural Health Work.—As in many other southern states, the county is an important unit for health work. Since 1917 the International Health Board has been aiding counties to build up full-time health organizations. In 1927 there were seventeen such organized counties, five of which are independent of outside financial assistance. In addition, the United States Public Health Service has been cooperating in the administration of eleven "sanitation officer" counties. In fact, a notable development in public health work has been the successful use of the non-medical health worker. In the biennial report for 1923, the health commissioner speaks of some of this work as "remarkable." There are thirteen counties in which the public health nurse is the sole paid health worker engaged. Of the 100 counties in Virginia there were at the end of 1927 full-time health workers in 42 counties.

Sanitary Engineering.—Supervision of water supplies and disposal of waste form the chief duties of this bureau. The law requires plans and specifications for water-works, but not sewerage, to be approved by the State Board of Health. Swimming pools and sanitary facilities at state institutions also come within the purview of this bureau. Since July, 1927, this bureau has been conducting an intensive campaign of sanitation in oyster-bearing areas.

Laboratories.—The main laboratory is in the State Office Building, while branch laboratories are maintained at Norton and Harrisonburg. These laboratories make general bacteriological examinations to aid in the diagnosis of all communicable diseases and also of water to determine its safety for drinking. The state does not supply free biological products to citizens, though it acts as agent for their distribution and sale at wholesale prices.

Epidemiology.—This bureau conducts general epidemiological studies and field activities for the investigation and control of communicable diseases. Morbidity statistics are collected. An assistant epidemiologist conducted in 1925 an extensive milk control campaign in cooperation with the State Dairy and Food Division and with assistance from the U. S. Public Health Service. The State Health Department, however, had no responsibility for sanitary control of milk. The bureau has received much aid from the International Health Board.

Child Health.—This bureau supervises health education, maternity and infancy, public health nursing, mouth hygiene and correction of defects. In 1918 the General Assembly passed an act known as the "West Law," which requires all

teachers to be instructed in health work, and all pupils to receive annual health examinations. Certain duties are placed on both the boards of education and of health of the state and much of the work is to be carried out cooperatively. The Federal Maternity and Infancy Law was accepted by the state in 1922. A child welfare library is maintained by this bureau. It also conducts a correspondence course for teachers, for mothers and gives midwife instruction.

Vital Statistics.—This bureau collects and compiles data on births, deaths, marriages and divorces. It enforces the law for the prevention of blindness at birth, and also a recent law aiming at the prevention of the intermarriage of white persons with those having even a trace of colored blood. The bureau also does some educational work.

Tuberculosis Out-Patient Service.—A general campaign against tuberculosis is conducted by this bureau by means of registration of cases, clinic organization, hospitalization, educational propaganda, and malnutrition classes. It also directs the motion picture education. The state has three sanatoria for the tuberculous, in widely separated sections, namely, Catawba, Blue Ridge, and Piedmont. The last named is for colored people. These sanatoria are directly under the jurisdiction of the health commissioner.

Social Hygiene.—The functions of the bureau are now entirely educational, though during the war and immediately thereafter, extensive medical, legal, protective and educational measures were conducted.

Publicity.—The bureau of publicity prepares and issues to the State papers from time to time, news items and articles on various phases of health work. This bureau also prepares bulletins for general distribution. These deal with every aspect of prevention of the more common communicable diseases and every detail of environmental sanitation. The editing of the annual report and all relations with the public printer are duties of this bureau.

HEALTH WORK OF OTHER STATE DEPARTMENTS

Supervision of the production of milk and the quality of food for human consumption comes under the Dairy and Food Division of the Department of Agriculture.

The Commissioner of Labor has supervision over sanitary conditions in factories. No part of the State Government deals with occupational diseases.

The Department of Public Welfare, in caring for delinquents and dependents, has various health duties. This department also supervises maternity homes.

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PHYSICAL EXAMINATION OF RAILWAY EMPLOYES*

By HUGH N. PAGE, M.D.,†
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The almost universal trend toward efficiency which pervades all of our industries and which is being applied even to the conduct of our daily lives, certainly appears to have secured a firm hold on the railroads of the country, if we may judge by the literature issued by them. Yet, in the face of this, it seems that some of the roads are neglecting one of the most potent factors in securing this efficiency.

Most of the responsible activities of the railroads are dependent upon man-power, and consequently it would seem absurd if in seeking the goal of high efficiency the efficiency of the man should be neglected.

The commonest causes of inefficiency in manpower are due to the consequences of ill health. The results of disease are best avoided by the discovery of the disease in its early stages and the institution of proper treatment. Periodical physical examination of employes is the first step in accomplishing this.

The life insurance companies have long recognized the beneficial results of periodical examinations. The Metropolitan Life Insurance Company reports having increased the life expectancy eight and one-third years by this means.

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Most of the larger railway systems, and certainly the American Railway Association, are convinced of the benefits of regular physical examination of employes. The report of "The Joint Committee on Physical Standards" of the American Railway Association, published in 1925, is very exhaustive, and due acknowledgment is hereby made to it for many of the facts contained in this paper. It is to the smaller roads that our efforts must be directed in order to convince them, if possible, of the importance of regular physical examination of employes and to secure the universal adoption of this measure.

The railroads should require a physical examination not only upon entrance to service, but re-examination should also be made at periodic intervals for the following reasons:

(1) *To increase the Efficiency of the Employes.*—Surely the statement that a man in good health is more efficient than one suffering from disease, even in the absence of symptoms, admits of no argument.

(2) *To Prolong the Years of Service of the Average Employe.*—This is a particularly important point as it is a real answer to one of the chief obstructions to the universal adoption of physical examination, namely, the antagonism of the employes themselves.

(3) *To Decrease the Incapacity Incident to Personal Injury Cases.*—There is no doubt that in many cases of personal injury the period of disability is much prolonged by some intercurrent constitutional disease, such as diabetes, arteriosclerosis, syphilis, to mention only a few.

(4) *To Obtain Necessary Data So That Some Physical Disability Existing Prior to Personal Injury, May Not Be Attributed to That Injury.*—Large inguinal rings or even a beginning hernia that may later become fully developed following injury are good examples of this.

(5) *To Reduce to a Minimum the Disability of Accident Resulting From Mental or Physical Man Failure.*—Occasionally extremely severe accidents are due to the sudden incapacity or death of an employe. This particularly applies to enginemen and if the fireman be busy on his side of the cab important signals may be run by or even a collision occur before any trouble is discovered. This is one of the main reasons for the necessity re-examination. If the physical condition of the employe were such that sudden incapacity were unlikely, many of these accidents could be avoided.

The entrance examination should consist of a very thorough physical examination of the whole body including eyes and ears. A blood Wassermann should be made and such other laboratory examinations as are indicated by the general examination. Those interested in the details of the examination are referred to the above mentioned report of the "Joint Committee on Physical Standards" of the American Railway Association.

Re-examination at intervals of not more than five years and preferably oftener, especially of employes over forty years of age, seems to me especially important, as in this way a check may be had on the general health of all employes and many accidents due to physical breakdown may be avoided. The opportunity for re-examination would also present itself at all times of promotion of employes and after a long illness or serious injury.

In view of the reasons mentioned above it seems remarkable that routine examinations are not universally adopted by all the roads.

The principal obstructions to universal adoption are two in number:

(1) The antagonism of the employes themselves, is due, I believe, to a mistaken idea. They feel that an examination, if defect were found, would prevent their obtaining a lucrative job. Especially are they antagonistic toward re-examination for the reason that it might cause the loss of a satisfactory position and certainly prevent promotion. In neither case do they realize that in the long run it would surely work for their benefit in prolonging their years of active service, as many of the conditions found are remediable. Surely if they knew that a physical breakdown were imminent they would not care to risk the lives of their fellow employes or of passengers by undertaking a responsibility for which they are not fitted.

When disability is found, the road can usually find a position in keeping with the ability of the employe and in consequence few lose their total earning power.

(2) The objection of the railroad management, is due also to what I believe to be a mistaken idea. Of course today practically all large trunk lines have entrance examination and many have a system of re-examination. It is from the short lines that most of the objection comes, and this is almost entirely a matter of expense. There is no question that it would add somewhat to the expense of the medical and surgical service, but I believe in the end it would

pay. The small roads argue that they have very few serious accidents under present conditions and the additional expense would neither be justified, nor would it bring a fair return. They do not realize that the fewer trains run, the smaller the shops, the fewer accidents, but these few accidents bear the same *ratio* of expense to the small roads. In fact the actual cost of accident is probably proportionately higher in small roads than in large, due to the fact that the same precautions are not taken to prevent them. The ideal is to have the fewest possible number of accidents and I do not think the question of expense should stand in the way of striving for this ideal.

It seems to me that the remedy for both of these objections lies in educational methods, and the medical and surgical officers of the railroads are the ones on whom the burden lies. Much of the propaganda now so popular for the periodical health examination of the public is applicable to this end.

To both employes and to the railroad management no opportunity should be lost to stress the fact that by physical examination of employes the years of service and the efficiency of the individual would be increased, the period of disability in many cases shortened and a large number of avoidable accidents prevented.

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DISCUSSION—*Abstract*

Dr. W. F. Smith, Little Rock, Ark.—The day has come when the railroads must demand physical fitness from their employes, and in return should provide means for preserving the physical fitness of the employes. Proper hospitals, emergency stations, safety-first organizations are all necessary to bring this about.

The objection to examination of new employes and re-examination of old employes is largely due, as Dr. Page stated, to fear on the part of those subject to examination that this may be the means of failure in securing a position, or result in a demotion. It is for the examining surgeon to inspire confidence that they will get a square deal, and to teach them the importance of early detection of diseased conditions in time for successful treatment.

In this connection, the prevalence of syphilis might be mentioned. In our work the percentage of syphilitic infection was so high that beginning January 1, 1927, a routine Wassermann examination was made in all patients. During the first half of 1927 the percentage of involvement was 18.75. This percentage seems to be dropping somewhat during the latter half of the year.

The subject of syphilitic infection in railroad men was presented to the recent meeting of Chief Surgeons, in Chicago, by Dr. O. C. Wenger, who is connected with the U. S. Public Health Service Clinic, at Hot Springs, Arkansas. We found that the greatest percentage of infection was among the engine and train service employes; the next largest percentage was among section hands.

Syphilitic infection is amenable to treatment if taken in time, and many years of useful service may be obtained for the employe. On the Missouri Pacific Railroad it has been the custom for many years to examine new employes. Since September 1, 1925, periodical examinations have been held.

Dr. H. T. Ballantine, Muskogee, Okla.—A volume could be written on primary examination and several volumes on re-examinations. It has been an amazing thing to me that the Interstate Commerce Commission has not been more active in the matter of re-examination of railway employes, since the safety of the traveling public depends upon the health of trainmen. Any of you who has had anything to do with trainmen has had experience with individuals who have dropped off suddenly, and who might have been at the throttle when death came.

The question of primary examination is not always the fault of the small road. Recently, I had occasion to examine for our own road some employes from a trunk line that intersected it. They took a lay-off of six months because work was slack, came down to our road, and I rejected 25 per cent for eye defects. At the expiration of their leave of absence, they went back to their own trunk line and went to work and became a menace to the traveling public, and they were not in stationary positions at that.

With us, the question has largely been the prevention of substitution. I well recall in my early work in railroad examinations a man who presented himself for examination as brakeman. He was in perfect shape, and yet some three hours late he turned up and reported to his superior with three fingers off. His brother had taken the examination, and he, himself, had reported for duty.

We have endeavored by signature in the presence of the examiner to obviate this difficulty, but it is not successful. I venture to say all of us in various positions write differently.

We have considered on our road, which is a small one, a family affair, the question of finger prints. That involved a good deal of danger, because it takes more or less an expert to read finger prints correctly, and then you meet the objection of it, because as the applicant sees it, it is almost a matter of criminal record.

On the question of periodic re-examination we are not going to overcome the prejudice of our employes in any reasonable length of time. It is, in my opinion, as I said in the beginning, a question for the Interstate Commerce Commission to work out for us because, after all, the larger interest is to the traveling public, and not to the employe or to the railroad. Those are matters of individual value, of safe-guarding the men, women and children who are on these trains and who board those trains with the assurance that they are going to reach their destination in safety.

Dr. A. R. Rozar, Macon, Ga.—We never take a forward step that we do not meet opposition. The question of examination of railroad employes has met a good deal of opposition. At a meeting of the American Railway Association, I heard this thing discussed and their main objection to it was that the Brotherhood opposed it, and it was almost impossible to do it.

There are twenty-five hundred employes in the town of the railroad that I represent. They have exam-

ination for new employes and re-examinations at any time they see fit. It is made plain to the employes that the examination is not made with the idea of putting them down, or putting them on the shelf, but to keep them at work, to remedy any defect they may find at the time of the examination. It is a daily occurrence for these employes to go and ask to have an examination. They fear there is something wrong and they want to find out what it is. I do not know of a single instance in the last year where there has been any opposition to re-examination.

Dr. J. W. Palmer, Ailey, Ga.—I happened to be on a Safety Committee some time ago, and I was surprised to see how many superintendents of the different divisions of the railroad did not seem to appreciate and understand what a physical examination meant to the railroad, to the public, to the employes and to the service.

When passengers are mapping out a route to travel to some resort or place of business, they ask the question, "Has this road physical examination for employes?" Many of them say, "I would rather travel over a road that has physical examinations for employes, because I do not feel it safe to ride behind an engineer who is not periodicaly examined."

Again, when a damage suit resulting from a wreck comes before a jury one of the things that is considered is: "Has this railroad physical examinations?" If not, the railroad is responsible for not having periodic examinations. This might cause the jury to render a verdict against the road.

Dr. W. S. Anderson, Memphis, Tenn.—The road that I represent, the Rock Island, requires all of its employes to have a complete physical examination. The method that we have adopted to keep another person from standing the examination for the applicant is: The applicant for employment is given a slip by his employer and that is signed in his presence. This slip is brought to the examining surgeon who, after his examination, has the applicant sign the application in his presence by a double signature. After that has been learned by the prospective applicants, it is very seldom that we have one to try to take the place of another.

The Rock Island since 1921 has adopted the re-examination at periodic times, and at first the employes were somewhat opposed to it, fearing, as Dr. Page has brought out, that there might be some opposition, that they might lose their jobs. But this has been rectified and they now take a sensible view of it, realizing that we are trying to take care of their health and to keep them in a good physical condition.

Dr. J. M. Burke, Norfolk, Va.—Your President and I as members of the Medical Section of the American Railway Association have fully provided that you get a real examination under the form that we are going to put into vogue for adoption by the various railroads. It is not just an ordinary insurance examination. It is exactly as if you are going into the Army or Navy in peace times. We have overcome the objection of the Brotherhood by calling in Mr. Stone, who was its head, and he has recommended it. So the employes are not objecting to it.

There are just a few railroads that have not put this examination in as yet. The railroads and their managements are absolutely in favor of it, but it is just like the pass question. They are halting, as it were, not that they are opposed to it, but it has not been put in vogue as yet.

I wish the chair would appoint a committee, demanding, first, for the benefit of the public and the employes of the railroads, that a physical examination of employes be required. On the question of foreign transportation the same course should be pursued.

Dr. Page (closing).—It was my intention to give a general survey of the subject and to attempt to point out some of the means by which the general adoption of physical examination by all the railways may be accomplished. The details are far too many to be gone into here.

I regret very much that Dr. Burke has seen fit to combine the pass question with physical examination. There seems to be no relation between the two things. Physical examination is important enough to stand by itself and I feel that the mixing up of the two issues, even in a committee, would lead only to confusion and possibly to the defeat of both.

A CASE OF SCURVY CURED WITH BANANA DIET*

By L. VON MEYSENBUG, M.D.,†
New Orleans, La.

It is well known that the ripe banana furnishes a source of the anti-scorbutic vitamin C second only to orange juice. Lewis,[1] Givens and McClugage,[2] Eddy and Kellogg,[3] Hess and Unger,[4] and others have demonstrated the protective, as well as curative properties of the banana against scurvy in infants and experimental animals.

The following case is recorded because the literature yields very few reports showing the cure of scurvy in the infant by banana feeding.

H.K., a white male, 19 months old was first seen February 17, 1927.

The chief complaint was pallor.

The father was living and was said to have anemia. The mother was living and well. One other child, aged five months was living and well. One brother died at three months of age of symptoms suggesting status thymolymphaticus. The mother has had no miscarriages and there was no known exposure to tuberculosis.

The baby was born at full term after a normal delivery and was apparently normal at birth. The birth weight was unknown but he was an average sized baby. Breast feeding was carried on for four months, at which time the mother had influenza and the baby was weaned. He was put on a formula of pasteurized, boiled milk in the proportions of 2 oz. milk plus 1 oz. water. The milk was increased 1 oz. each month, the water 0.5 oz. The milk was always boiled three minutes. At 7 months whole milk, pasteurized and boiled three minutes was given, the total amount for the day

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*Read in Section on Pediatrics, Southern Medical Association, Twenty-First Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

†Instructor in Pediatrics, Tulane University.

seldom being over one pint. No orange juice or other antiscorbutic was included in the dietary. At 1 year he received cereal, chiefly oatmeal and at 16 months soft cooked egg and bread were added, in addition to about 24 oz. whole milk pasteurized and boiled three minutes. At 18 months rice was added.

The present illness began gradually with an appearance of pallor. Two months before coming in the patient fell over a rocking horse after which he limped, favoring the right leg. Pain was apparently absent. The appetite had been fair, the bowels constipated and the baby had been restless in sleep for some time.

Physical examination showed a fairly well developed and nourished male baby, with definite pallor of the skin and mucous membranes. The stripped weight was 29 lbs., 12 oz., circumference of the head 19 1-4 in., of the chest 21 in. and of the abdomen 20 in. The muscles were flabby and the tissue turgor poor. The anterior fontanelle was nearly closed.

The teeth were in fair condition and alignment. The gums were red, swollen, spongy and bled when pressed with the tongue blade. There was no adenopathy.

The chest was well developed and symmetrical, the beading two plus and angular.

The heart showed no enlargement, the rate was rapid and there was a soft systolic murmur at the apex, not transmitted.

The lungs were normal throughout.

The abdomen was normal. The spleen was felt 2 finger breadths below the costal margin. The liver edge was not palpable.

The knee jerks were active. There was no Kernig or Brudzinski.

The extremities showed no evidence of tumor over any of the long bones.

Laboratory Reports.—The hemoglobin was 35 per cent (Dare); the red blood cells were 2,610,000; white blood cells 7,500; neutrophils 65 per cent; lymphocytes 30 per cent; large mononuclear leucocytes 5 per cent; there was considerable achromia and polychromatophilia; there were no plasmodia.

The blood Wassermann of mother and baby were both negative. The urine was negative throughout.

X-ray Report.—"There is elevation of the periosteum with irregularities in the diaphysis of the bone (femur) immediately behind the epiphyseal line. These changes are typically those seen in scurvy. Radiograms of the long bones fail to show any luetic process; the cortex of the bone appears to be normal and from the roentgen standpoint it must be concluded that this patient has scurvy."

Treatment.—The diet of the baby was not changed except for the addition of 1 tablespoon of ripe, mashed banana pap, to be increased daily, if tolerated, by 1 teaspoonful up to 1 whole banana.

March 12, 1927, two weeks later, the patient reported. He was much improved, the appetite was better, sleep was normal, the bowels acted once daily, and he did not limp. The banana was eaten with considerable relish. He was still very pale, but the gums did not bleed and were normal in appearance. There was a systolic murmur at the apex of the heart, not transmitted. The lungs were normal; the abdomen normal; and the spleen just palpable. March 19, one week later he returned with a very good appetite, sleeping well, and with bowels normal. The banana was increased to two whole bananas daily. Saccharated carbonate of iron was given. April 9, he returned with a fresh cold and cough. Examination showed good tissue turgor; very slight pallor and evidences of an upper respiratory infection. X-ray of the long bones failed to reveal any pathological condition. July 11, the x-ray report was as follows: "No evidence of scurvy is present at this time; that is, no active lesions. The bone changes, however, are those of healed scurvy."

SUMMARY

A 19 months old baby, weaned at 4 months and put on a diet of pasteurized and boiled milk with no anti-scorbutic showed marked pallor, severe anemia, bleeding gums, a rapid heart with systolic apical murmur and x-ray changes typical of scurvy. The diagnosis was clean cut and scorbutic.

One tablespoon of banana, increased daily, was added to the diet, which was otherwise not changed and which contained no other anti-scurbutic.

The subsequent course showed a disappearance of the scurvy.

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Physicians and Surgeons Building.

DISCUSSION

Dr. Joseph Yampolsky. Atlanta, Georgia.—The case of scurvy cured with a banana diet is another testimonial in favor of this fruit as a food for infants. Not only is the banana a valuable food with curative qualities, but it is easily obtained and its cheapness places it within the reach of the very poorest.

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DR. M. Y. DABNEY, Editor
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EDITORIAL DEPARTMENT

VITAMINS B AND E IN LACTATION

Vitamin B is the water-soluble vitamin found in rice polishings and in yeast, and known for some years to prevent the development of polyneuritis in pigeons. It has been variously prescribed and recommended by yeast manufacturers. Vitamin E is a more recently described vitamin regulating fertility, found in wheat germ oil, egg yolk and lettuce. Animals on a vitamin E deficient diet may develop normally; their sexual cycle is normal; and they conceive normally. However, after a time gestation ceases and the placenta and fetus are absorbed. The ova are typically healthy and implantation takes place in vitamin E deficiency, but is followed by resorption. Another type of disorder of reproduction has been described due to diet deficient in vitamin A, in which fertilization and implantation fail.[1]

Gestation and lactation occasion a severe drain on the animal, and food adequate for normal maintenance, contrary to older ideas, may fail under these conditions of stress.[2] [3] The requirements of vitamin B during lactation are three or more times as great as for maintenance of the normal animal. This is due, according to Sure, to the fact that vitamin B is not secreted quantitatively into the milk. Only a fraction of the intake goes into the milk. Nursing rats with deficient vitamin B die with hemorrhages in the osteogenetic tissue, and also in some of the viscera. Their stomachs are distended with curd. Their death occurs when the source of milk is an animal whose diet had proved entirely satisfactory for welfare and growth during the non-lactating period.

The increase of yeast, or vitamin B, in simplified diets lowers the mortality of the young rats and increases the birth rate of the older. Simplified diets to which 0.6 gram yeast was added, were satisfactory for rearing animals from the twenty-first day of life, and their growth and ovulation on this mixture were approximately equal to that produced by the best natural foods.[3] However, females on these rations always became sterile early in life, and addition of a few drops of wheat germ oil, E source, daily during gestation were necessary to produce litters of living young.

Lack of vitamin E not only prevents normal gestation, but also prevents normal development of nurslings.[4] Animals who were receiving the large quantity of vitamin B shown to be necessary for successful nursing, were given enough vitamin E for reproduction. After the birth of the litters they were deprived of vitamin E. Then a surprising disorder resulted. The young nursing animals reached a normal size, had excellent glossy coats, and were in apparently good condition until the twenty-first day. Then paralysis developed in a large number of them; and they were unable to right themselves when placed on their backs. About thirty-five per cent died in a few days. Half continued to live and show paralysis of some limb or muscle group throughout life. All attempts to cure the disease after its manifestation resulted in failure.

Somewhat related conditions have been reported to follow deficiency of other vitamins than E. Evans and Burr report that the existence of paralysis is classically associated with impoverishment of vitamin B, and is known to be a feature in defective vitamin C, not to mention the recent association of leg weakness in fowls with vitamin D. By various experiments of adding the four first known vitamins to the diet without effect in the prevention of paralysis, they eliminated these as causes of this particular condition. They noted that the foods which prevented the paralysis, wheat, yellow corn, and lettuce, were recognized sources of vitamin E. Wheat germ oil was administered either by mouth

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or by needle to half of a large number of litter mates, the other half being kept as controls; and it was found to prevent the condition entirely when used before the fifteenth day of life. Purified sources of vitamin E, fractions of wheat germ oil, were also used successfully to prevent the development of paralysis. It seemed to Evans and Burr well established that vitamin E, the fertility vitamin, was also necessary for normal lactation.

A vitamin deficiency, like a deficiency of an internal secretion, usually has an outstanding effect by which it is first recognized, and many other effects which attract less general notice. Lack of vitamin A in the extreme form causes xerophthalmia; in milder form it results in a disorder of reproduction. Deficient thyroid secretion, which predominantly affects growth and metabolism, also affects the skin and reproductive organs. The physician who attends women in pregnancy and after parturition has peculiar opportunities to use his knowledge of vitamin deficiency in animals to prevent some of the infant morbidity and mortality, and perhaps a number of disorders of adult life.

ENGLISH JURIES AND DAMAGE SUITS

The damage suit against corporations, employers, physicians, or any individual is increasing in popularity, and bids fair to become a potent legal weapon not for the administration of justice, but for the more equal distribution of property in a country where labor and capital are antagonistic. The ideal of the sanctity of private property, upheld in the face of some opposition, by the American Chief Justice Marshall in this country not very many years ago,[1] abolished entirely in Russia after the War by the Bolsheviki, is to some extent undermined by the damage suit. This is for the reason that a jury very frequently awards damages not so much against the guilty as for the needy.

The instance is quoted in the *Lancet*, under "Medicine and the Law" of a heavy jury judgment against one Dr. Alcock in Gloucester Assizes.[2] A little girl eight years old fell from a donkey and fractured her left arm above the elbow. This was set by Dr. Alcock shortly afterward and the child was sent to a nursing home. It was later claimed that the arm had been set in a bent position without proper alignment, that the arm muscles had atrophied, and Volkmann's contracture had resulted. The child, said to be a particularly promising musician, was unable to follow her profession. Dr. Alcock exhibited x-ray films, taken before, during, and after treatment, which showed perfect alignment. However, the jury found against the defendant and awarded the child twenty-one hundred and fifty pounds.

"If the natural sympathies of a jury toward a little girl of eight whose potential prospects as a professional musician are unhappily marred by an accident to her arm," says the *Lancet*, "are to be translated into the award of heavy damages against a medical practitioner who has followed the most approved surgical practice, then we really seem to be approaching the position in which a surgeon must be taken to guarantee the success of every operation he undertakes . . . There is something wrong with the system when such a verdict can be enforced against a professional man." And they quote the comment of Lord Justice Scrutton regarding the same case, that: "A jury is rarely a good tribunal to decide questions of professional skill."

In another instance[3] the jury found for the defendants, Messrs. Bates and Wilson, medical practitioners of St. Albans, in a suit in which a Mr. Stroud claimed damages for alleged unskillful treatment of a fracture of the femur after a motorcycle accident. The patient according to his physician, had refused x-ray examination. This Stroud denied. "The jury was absent for four hours. To its verdict for the defendants it added the singular rider. 'We are of the opinion that Dr. Wilson should have protected himself by calling in another doctor and repeating in his presence the advice that Mr. Stroud should go to the hospital and submit to roentgen rays.'" "Why should he call in a physician," asks the *Lancet*. "Why not a notary?" Again it concludes that a jury is an unsatisfactory tribunal for determining issues of professional skill or negligence.

The *Lancet* might have added the comment that there is often another physician back of these suits. The patient is induced to the attack by remarks from a hostile source, frequently within the medical profession.

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LOCALIZATION OF CHICKEN TUMORS

A number of years ago Rous[1] described a chicken sarcoma which could be transmitted from fowl to fowl by a cell-free filtrate. This was the only known tumor which behaved like an infectious disease. Gye[2] and Barnard[3] showed that two factors were necessary for production of this fowl tumor. Tumor material could be inactivated with chloroform, and old tumor filtrate was also inactive. But if the two components, old tumor filtrate and chloroform treated extract, were injected together a tumor resulted. Be believed that he had separated two factors necessary for the production of tumors: one particulate and probably a virus; the other an unstable chemical substance without which the virus could not multiply in the cells.

Murphy[4] later produced chicken tumor by simultaneous injections of a choloroform treated portion and embryo extract, and felt that his work did away with the necessity for believing that a transmissible virus was concerned, in the work of Gye and Barnard.

Cori[5] showed that the supernatant fluid from a culture of embryonic tissue was just as effective in reactivating a chloroformed extract from a fresh tumor as was the supernatant fluid from a tumor culture. Due to the unspecific nature of the reactivation process, Gye's interpretation that a living organism is involved in this type of experiment seems to Cori not warranted.

Since the prevailing medical teaching is to avoid all local irritation as a cancer preventive measure, factors that produce or localize experimental cancer have always been of interest. Tumors of mice, rats, chickens are readily transmitted by inoculation of tumor material under the skin of a normal animal. They are induced by repeating painting with irritating substances such as coal tar products. Human cancer inoculation from a patient's cancer at operation has been reported. Jones with others[6] observed that after inoculation of cancer material into the peritoneal cavity of experimental animals, injury determined its localization. Mackenzie and Sturm[6] injected tumor material intravenously, and rarely observed tumors, but frequently found lesions of the ovary. However, if they first injured the pectoral muscle of hens by injection of Scharlach R, coal tar, or embryonic tissue, and a few days later injected the tumor agent intravenously, in a large per cent of cases typical tumors developed in the breasts.

Mouse cancer has been reported by Maud Slye to be regularly inherited as a Mendelian recessive. By carefully following the pedigree of mice, she has produced families in which one hundred per cent cancer mortality could be prophesied and regularly was observed.

Oertel,[7] in describing what he believed to be nerves running through typical human cancers, asserted that the conception of cancer as a purely local riotous growth to be treated by local means, must be abandoned.

Clinically, it is probable that irritation cancers such as those described by Yamagiwa from repeated painting with tar[8] rarely occur. The extreme degree of irritation applied to animals would infrequently occur in human experience, and could not explain the high incidence of malignancy in civilized countries today.

It is probable that two factors must still be sought in human cancer: a systemic factor or tendency to the disease, whether inherited or artificially acquired, and a weak or irritated spot. Since the systemic factors are unknown, to avoid local irritation is still the strongest means of combat of cancer. Victory in prevention and cure of the disease is not yet close at hand.

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Asheville—Where We Meet

ATTRACTIONS OF ASHEVILLE

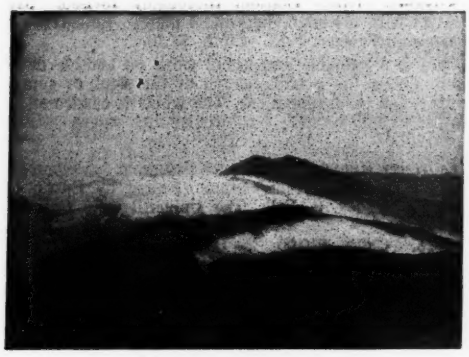
There is often a question in the minds of those who arrange for the annual meetings of conventions as to what time of the year is the most favorable season to choose for a meeting in a given city. Asheville is fortunately so situated that almost any season is favorable for a convention in the Land of the Sky. Asheville entertains thousands of visitors at all seasons and the autumn dates chosen for the meeting of the Southern Medical Association will bring the members of this organization to western North

*By John D. Topping, Publicity Director, Asheville Chamber of Commerce.

Carolina during one of the most beautiful months of the year.

The autumn season in the mountain region of the Old North State is a most delightful period. Changing colors of foliage and the bright, exhilerating Indian summer days add to the pleasure of the visitor in Asheville at this time. Asheville, however, has a most equable climate at all seasons and convention delegates visiting this city any month of the year find much of the unique charm which is characteristic of the Land of the Sky.

Owing to the peculiar geographical location of the city in the mid-southern region, together with its optimum altitude of twenty-three hundred feet above the sea level, Asheville enjoys the warm winters of the South and the cool bracing atmosphere of the mountain climate during the summer months. As this city is a popular resort the year round, a comprehensive program of



In the Land of the Sky

activities and entertaining events is planned at all seasons.

Golf is one of the most popular sports at Asheville. Four excellent golf courses and a fifth course which will be opened in September this year, are available to visiting golfers. These courses include those of the Asheville Golf and Country Club, the Biltmore Forest Country Club, the Malvern Hills Course, the Lake View Country Club, and the Municipal Course. Of these courses all are of eighteen-hole extent with the exception of the Malvern Hills Course which is at present restricted to nine holes. The splendid golf equipment of the city has led to the establishment of many golf functions and activities here during the year. Chief among these are the annual invitation tournaments held at the Biltmore Forest Country Club and the Asheville Golf and Country Club in July and August. These events attract golfers from all parts of the United States.

The region near Asheville offers also many trout streams which tempt the angler. The streams of Western North Carolina are stocked annually with good rainbow trout and the annual fishing season opening in April brings to Asheville many of the exponents of the sport of Izaak Walton.

It is most unusual for a mountain resort to offer to visitors an annual season of water sports. In the Land of the Sky over thirty lakes have been created by the damming of mountain streams and some of these bodies of water are large enough to allow for sailing crafts and large motor boats. An annual regatta is held at Lake Lure near Asheville and at Lake Craig, the Asheville municipal lake. The magnificent Asheville swimming pool is also the scene of an annual water sports carnival. Tennis, mountain climbing, hiking over the alluring trails in the vicinity of Asheville, or following winding bridle trails to the summits of nearby mountains on horse back are sports which are always on the annual program.

In addition to the annual round of outdoor activities, Asheville offers a number of outstanding social events. These include the Historical Ball held in February at Kenilworth Inn, at which the costumes of the old South are displayed by beautiful sponsors from many cities of the Southern states. A two-day horse and hound show is held in Asheville in April and the summer season beginning in June boasts of one of the most colorful affairs held in this skyland city, the Rhododendron Festival, staged during the season when the wild mountain gardens are at the height of their glorious bloom. A summer opera season, an industrial exposition, a mountain arts and crafts festival and other items are on the program for 1928.

The visitor is certain to find much of interest in Asheville at all seasons.

Book Reviews

An Outline History of Ophthalmology. By Thomas Hall Shastid, A.M., M.D., F.A.C.S., Sc.D., LL.B., etc. Duluth, Minnesota. Southbridge, Mass.: American Optical Company.

Shastid is always entertaining if not always accurate. The reviewer was "beaucoup intrigued" (as they say in the army) with this charming little tabloid History of Ophthalmology, until arriving at page 588 he stumbled upon the following bit of misinformation. "The discovery of the first general anaesthetic was made in America, by Wm. T. G. Morton, a dentist of Charlestown, Mass., in 1846". Thus was the veil rent in twain, disclosing—what? History or romance? Anyway it is good reading.

Diagnosis and Treatment in Diseases of the Lungs. By Frank E. Tylecote, M.D., D.P.H. (Vict.), F.R.C.P. (Lond.), Honorary Physician to the Manchester Royal Infirmary; Lecturer in Clinical Medicine in the Victoria University of Manchester; and George Fletcher, M.A., M.D. (Glas.) M.R.C.P. (Lond.), D.P.H. (Camb.), Assistant Tuberculosis Officer, Lancashire County Council. 270 pages. New York: Oxford University Press, 1927. Cloth, $2.25.

There is a noticeable tendency of modern medical literature to the limitation to monographs upon a given subject rather than to the use of larger volumes, as in the older systems of medicine. This monograph on the lungs is of the stereotyped variety following old lines. There is little that is original in it. It contains some of the knowledge of pulmonary conditions, and a great deal of superfluous material. The text is very poorly arranged.

Were it not for the fact that it is a monograph there would be but scant place in the literature for it.

The Principles and Practice of Obstetrics. By Joseph B. DeLee, A.M., M.D., Professor of Obstetrics at the Northwestern University Medical School. Fifth Edition, thoroughly revised. Large octavo of 1140 pages with 1128 illustrations, 201 in colors. Philadelphia and London: W. B. Saunders Co., 1928. Cloth $12.00 net.

A review of this standard work on obstetrics seems superfluous. However, comparison of the subject matter of the present edition, chapter by chapter, shows that the revision has been painstaking, and that new matter has been added and evaluated. The completeness and detail with which every subject is treated make the book a joy to the practitioner, and the despair of the student in the schools where it is the text book on obstetrics. Dr. DeLee recognizes this in the preface to the Fifth Edition and suggests the "skimming over" of many pages. This is difficult for the student to do, and sometimes dangerous, for the instructor may not chance to "skim over" these same pages. A text book commensurate in size to the time given obstetrics by the schools should be available.

Conservative, as always, Dr. DeLee again cautions the accoucheur against too hasty recourse, without proper indications, to the more or less radical measures such as forceps, and version. But where such measures are indicated the most careful details of manipulation are given.

Physical Diagnosis. By W. D. Rose, M.D., Associate Professor of Medicine, University of Arkansas, Little Rock, Arkansas. Fifth Edition. 819 pages with 310 illustrations and 3 color plates. St. Louis: C. V. Mosby Company, 1927. Cloth, $10.00.

Little of censure or praise can be said for this book. It follows the usual arrangement of such works, and apparently presents nothing new in the subject matter.

Childbirth. An Outline of Its Essential Features and the Art of Its Management. By William George Lee, A.B., M.D., 300 pages, illustrated. Chicago: University of Chicago Press, 1928. Cloth, $3.00.

About the size of the ordinary novel, this book can be read through with pleasure and profit by any one desiring a review of the essential features of childbirth. Tribute must be paid the clear word pictures which take the place of illustrations in other works. A few line drawings comprise the actual illustrations of the book.

The Use of Symptoms in the Diagnosis of Disease. By Hobart Amory Hare, B.Sc., M.D., LL.D., Professor of Therapeutics and Diagnosis in the Jefferson Medical College of Philadelphia; One-Time Clinical Professor of Diseases of Children in the University of Pennsylvania. Ninth Edition, thoroughly revised. 528 pages with 124 engravings and 4 plates. Philadelphia: Lea and Febiger, 1928. Cloth, $5.50.

This is a valuable and useful work on bedside diagnosis, giving the possible cause, of the signs or symptoms found on examination. The whole is condensed as much as could be with a subject of such extent.

The Newer Knowledge of Bacteriology and Immunology. By Eighty-Two Contributors. Edited by Edwin O. Jordan and I. S. Falk, The University of Chicago. 1196 pages. Chicago: University of Chicago Press, 1928. Cloth, $10.00.

In looking through the list of authors of this volume one is surprised to see the very long list of American bacteriologists, contributors, nearly all of whom have a distinct claim to fame in some line of bacteriological research. Each of the eighty-two authors of this volume has written fully, yet with restraint and conservatism on a phase of bacteriology with which he is well qualified to deal. All have elsewhere made valuable contributions to the periodic literature of their subjects. Opposing views are here sometimes expressed on the same subjects, and there has been no attempt at uniformity of nomenclature.

Morphology, staining reactions, classifications, growth, action of culture media, utilization of various food substances are chapter subjects. There are special discussions of groups of micro-organisms.

The latter third of the book deals with immunity and immune bodies, antigens, agglutinins, precipitins, phagocytosis and the various tests for syphilis, anaphylaxis, atopy, and chemotherapy of bacterial diseases.

The work reminds one of a recent paper in the JOURNAL upon "Big Books and Much Teaching." It is very heavy to hold on the lap. An excellent reference for the physician or advanced student in bacteriology, it does not purport to be a text-book.

One might make the generalization that any text book designed to introduce a subject should be written by one man. The system, like this, by many authors with many opinions, is valuable for later study.

Mental Disorders. By Hubert J. Norman, M.B., CH.B. (Edin.); D.P.H. (Cam. and Glas.), Medical Superintendent, Charnwell House, London; Lecturer on Mental Disorders, Westminster Hospital Medical School. 463 pages, illustrated. New York: William Wood and Company, 1928. Cloth, $5.00.

This is an elementary treatise on mental disorders. Because of its clear diction it is easy to read. Its teaching is modern. It may be added that the author is not a follower of Freud.

What You Should Know About Heart Disease. By Harold E. B. Pardee, M.D., Assistant Professor of Clinical Medicine, Cornell University Medical School; Assistant Attending Physician, New York Hospital, etc. 120 pages. Philadelphia: Lea and Febiger, 1928. Cloth, $1.50.

The manual is written to give the patient an understanding of heart disease, and the manner of presentation is such that it will in no way interfere with the physician's management of his case. It will teach the patient how to observe and report his symptoms to his medical attendant. Treatment is covered only in generalities so that no one would attempt to use the book for self-treatment.

Clinical Aspects of the Electrocardiogram. A Manual for Physicians and Students. By Harold E. B. Pardee, M.D., Assistant Professor of Clinical Medicine, Cornell University Medical School; Assistant Attending Physician, New York Hospital; Consulting Cardiologist, Lying-In-Hospital and Woman's Hospital, New York City. Second Edition. 242 pages with 60 illustrations. New York: Paul B. Hoeber, Inc., 1928. Cloth, $5.50.

The present edition has been extensively revised in those sections assigned to the ventricular complexes in pathological conditions. The standard forms of electrocardiographs obtainable in the United States have been described. The teachings are in conformity with modern accepted ideas.

Lobar Pneumonia. A Roentgenological Study. By L. R. Sante, M.D., F.A.C.R., F.A.C.P. Associate Professor of Radiology, St. Louis University Medical School; Radiologist to the University Group of Hospitals (St. Mary's Hospital & Infirmary); Chief City Radiologist to St. Louis City Hospitals; Consultant Radiologist, Koch Hospital for Tuberculosis, St. Louis Training School, etc., with a foreword by James T. Case, M.D., F.A.C.S., Battle Creek, Mich. 137 pages, illustrated. New York: Paul B. Hoeber, Inc., 1928. Cloth, $3.00.

This little monograph presents the subject in clear detail.

Sections even in this roentgenological study are devoted to a clinical consideration of pneumonia. The pathology of the condition, experimental inoculation, and roentgenographic characteristics are adequately given. The contrast in the methods of spread of the pneumonic process and the initial consolidation in adults and children is well contrasted in two sections. Pulmonary complications prognosis and differential roentgen-ray diagnosis are worthy of special mention, and careful study. The references are full and the author shows a desire to give credit where it is due. The illustration and diagrams are well executed and chosen.

Physical Diagnosis. By Charles Phillips Emerson, A.B., M.D., Professor of Medicine, Indiana University School of Medicine. 553 pages, illustrated with 324 illustrations. Philadelphia and London: J. B. Lippincott Company, 1928. Cloth, $7.00.

Dr. Emerson's book is an attempt to teach physical diagnosis by physical signs alone and is admirable in its strict adherence to the subject matter implied in its title. Nowhere is any mention made of the correlated laboratory or other aids. This fact may be brought out more clearly when it is realized that the words blood, urine, urea, feces, do not appear in the index.

It impresses this reviewer as more an attempt to list and classify the various physical signs of disease than a deep discussion of their significance.

The volume begins with a short history of physical diagnosis, then takes up the various general signs such as cyanosis, edema, body weight and contour. Next come the various skin manifestations of disease followed in order by the diseases of the head, chest, abdomen, and extremities. In each instance the disease and the physical sign are in black faced type which is helpful in rapid reference work.

This book would seem more useful as a classroom text in teaching physical diagnosis than as an aid to the practitioner. However, as a ready reference to the application of the large number of physical signs now known it has much value.

Cardiac Arrhythmias. Clinical Features and Mechanism of the Irregular Heart. By Irving R. Roth, M.D., Assistant in Medicine; Chief, Children's Cardiac Clinic, Mt. Sinai Hospital; Instructor in Post-Graduate Studies on Diseases of the Circulatory System conducted by Columbia University at Mt. Sinai Hospital, New York. Introduction by Emanuel Libman, M.D., Clinical Professor of Medicine, Columbia University. 210 pages with 80 illustrations and 5 tables. New York: Paul B. Hoeber, Inc., 1928. Cloth, $7.50.

The use of diagrams helps to make this elementary treatise on cardiac arrhythmias easily understood. There is a very clear description of the mechanism of the cardiac arrhythmias and the sections devoted to atrial fibrillation and atrial flutter are worthy of special mention.

A Text-Book of General Bacteriology. By Edwin O. Jordan, Ph.D., Professor of Bacteriology in the University of Chicago and in Rush Medical College. Ninth Edition, thoroughly revised. Octavo of 778 pages with 191 illustrations. Philadelphia and London: W. B. Saunders Company, 1928. Cloth, $6.00.

One of the best standard text books of bacteriology, this has again been revised and prepared for the present day student. The chapter on parasitic protozoa has been entirely rewritten, and additions and corrections were made where indicated in other sections of the book. Some material has been omitted, so that the volume is still of a convenient size.

Muscle Function. By Wilhelmine G. Wright, Boston, with a Foreword by J. Playfair McMurrich, Professor of Anatomy, University of Toronto. 188 pages illustrated. New York: Paul B. Hoeber, 1928. Cloth, $3.50.

Miss Wright has had the opportunity and patience to make a most careful study of muscle functions. Rather than name as its function that motion or motions which a particular muscle seems mechanically able to perform, she has chosen to record what each skeletal muscle actually accomplishes, under what conditions it is activated and with what result. Such knowledge is essential to intelligent extremity repair.

There is an important difference between what certain muscles seem purposed to do and what they actually do. The substance of this small volume is accurate and dependable; its presentation is well arranged for reference.

Southern Medical News

ALABAMA

At the recent annual meeting of the Alabama State Medical Association held in Birmingham, the following officers were elected: Dr. E. V. Caldwell, Huntsville, President; Dr. G. F. Littlepage, Sheffield, Vice-President, North Alabama. To vacancies on the Board of Censors the following were elected: Dr. J. N. Baker, Montgomery; Dr. W. W. Harper, Selma; Dr. J. P. Stewart, Attalla; and Dr. James S. McLester, Birmingham. Mobile was chosen as the meeting place for 1929.

The Banquet, Medical Department, University of Alabama, was held April 18 at the Southern Club, Birmingham. The following officers were elected: Dr. Gilbert F. Douglas, Birmingham, President; Dr. R. C. McQuiddy, Birmingham, Vice-President; Dr. J. H. Somerville, Tuscaloosa, Secretary; Dr. J. D. Dowling, Birmingham, Treasurer.

Dr. Stuart Graves, Professor of Pathology and Dean, University of Louisville School of Medicine, Louisville, Kentucky, has been appointed Dean of the School of Medicine, University of Alabama, Tuscaloosa, to succeed Dr. Clyde Brooks, who has been appointed Chairman of a newly created Faculty Committee on Research, for which the last Legislature made a special appropriation. The appointment of Dr. Graves is said to be the first step in a program to establish a four year medical course as a part of the University. Members of the Advisory Council who will assist in making plans for the four year medical course are Dr. Graves, Dr. Samuel W. Welch, State Health Officer, Montgomery, Dr. James S. McLester, Professor of Medicine, Birmingham, and Dr. Denny, President of the University, Tuscaloosa.

Dr. George T. Pack, Professor and head of the Department of Pathology, University of Alabama School of Medicine, Tuscaloosa, has accepted an appointment at the Memorial Hospital for Malignant Diseases, New York, and will take up his new duties July 1.

Deaths

Dr. Foster Gaines Finley, Blountsville, aged 40, died March 8 of cerebral hemorrhage.

Dr. Charles I. McElroy, Coffeeville, aged 48, died November 24 of burns received when his home caught fire.

Dr. Felix Henry Compton, Birmingham, aged 71, died March 2 of cerebral hemorrhage.

ARKANSAS

Chicot County Medical Society has elected Dr. W. A. Craig, President; Dr. W. W. Easterling, Eudora, Secretary.

Ouachita County Medical Society has elected Dr. J. S. Thompson, Granette, President; Dr. J. S. Rinehart, Camden, Vice-President; Dr. R. B. Robins, Camden, Secretary-Treasurer.

St. Francis County Medical Society has elected Dr. P. P. Boggan, Forrest City, President; Dr. H. L. McClendon, Palestine, Vice-President; Dr. J. O. Rush, Forrest City, Secretary-Treasurer.

The City Hospital, Helena, to be built and operated by the City, will be completed in the fall. It will be three stories and contain 70 beds.

Dr. Glen M. Holmes was recently appointed Chief of the Staff of the Arkansas Children's Hospital, Little Rock.

Dr. A. M. Elton and Dr. M. L. Harris, Newport, announce the completion of the Newport Sanitarium. It was formerly the Elks Club Building, now enlarged and remodeled.

Deaths

Dr. Alexander Davison, Camden, aged 71, died suddenly March 7 of heart disease.

DISTRICT OF COLUMBIA

The new medical school building of Howard University was formally opened April 9-10.

The new $300,000 addition to the Georgetown University Hospital, Washington, has been completed. It is a five story building and adds 128 beds to the capacity of the hospital.

Dr. Simon Flexner, of the Rockefeller Institute for Medical Research, who has been chosen by the Association of American Physicians as the lecturer of the Kober Foundation for 1928, delivered a lecture at Georgetown University, Washington, March 27, on "Obvious and Obscure Infections of the Central Nervous System."

Col. Bailey K. Ashford, Medical Corps, U. S. Army, who recently retired from active service, has been appointed by the Government of Porto Rico as its representative to the International Congress of Tropical Medicine and Hygiene, to be held at Cairo, Egypt, December 28.

Deaths

Dr. John Barton Quay, Washington, aged 74, died March 19 of arteriosclerosis and acute dilatation of the heart.

Dr. George Peterson, Washington, aged 48, died February 20 at the Garfield Memorial Hospital, of Hodgkin's disease.

Dr. George Nicholas Acker, II, Washington, aged 39, died February 27 of heart disease and lobar pneumonia.

Dr. William Amos Gilroy, Washington, aged 27, was found dead in bed February 29 of lobar pneumonia.

FLORIDA

At the fifty-fifth annual meeting of the Florida Medical Association, at Tampa recently, Dr. Frederick J. Waas, Jacksonville, was elected President; Dr. Mozart A. Lischkoff, Pensacola; Dr. Leland F. Carlton, Tampa, and Dr. George W. Potter, St. Augustine, Vice-Presidents; Dr. Shaler Richardson, Jacksonville, Secretary-Treasurer (reelected). The next annual meeting will be held in St. Augustine. Dr. John A. Simmons, Miami, the retiring President, was presented with a scarf pin as a token of appreciation of the service rendered the Association.

The Marine Hospital, Key West, is being renovated and modernized. Dr. M. S. Lombard is the surgeon-in-charge.

The Lauderdale Memorial Hospital, Ft. Lauderdale, has elected the following officers: Dr. C. J. Wiig, President; Dr. D. E. Carter, Vice-President; Dr. H. J. Peavy, Secretary. Board of Directors: Dr. C. J. Wiig, Dr. Leigh F. Robinson, Dr. L. H. Maxwell, Dr. H. A. Walker and S. P. Brush.

The Bartow Municipal Hospital was recently opened.

The Florida State Hospital for the mentally deranged, Chattahoochee, recently observed its fifty-second anniversary. From a small institution, it has grown to that of an establishment with a large staff, 116 buildings, and 6,836 acres of land. It is said the

(Continued on page 34)

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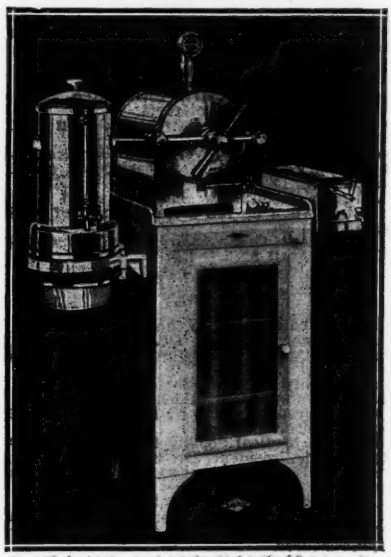

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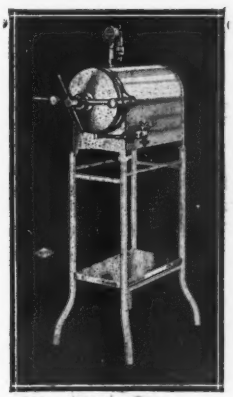

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(Continued from page 504)

inventory value of the institution is two million dollars.

The City of Tampa has adopted an ordinance providing that the salary of the City Health Officer be reduced from $9,000 to $6,000 a year, effective April 1. The present Health Officer is Dr. Charles W. Bartlett, who succeeded Dr. Ernest C. Levy.

Dr. J. L. Johnson, Orlando, has been appointed City Physician to fill the unexpired term of Dr. W. W. Farnell, deceased.

Dr. S. H. Townsend, St. Petersburg, has moved to Oklahoma where he has accepted a hospital position.

Deaths

Dr. George Carson Taggart, Clearwater, aged 57, died February 29 of arteriosclerosis.

Dr. William Hector Park, Hawthorne, aged 69, died December 5.

Dr. Allen Seaborn Hargrove, Lake Hamilton, aged 52, died February 11 of injuries received in an automobile accident.

Dr. C. Pruyn Stringfield, Sarasota, aged 61, was killed March 6 when he fell from the roof of a nine-story building.

Dr. S. Lambrecht, Greenville, died suddenly at Valdosta, Georgia, April 5.

GEORGIA

Blue Ridge Medical Society has elected Dr. J. M. Daves, Blue Ridge, President; Dr. N. C. Goss, Ellijay, Vice-President; Dr. C. B. Crawford, Blue Ridge, Secretary-Treasurer.

Campbell County Medical Society has elected Dr. T. P. Bullard, Palmetto, President; Dr. W. R. Camp, Fairburn, Vice-President; Dr. A. J. Green, Union City, Secretary-Treasurer.

Carroll County Medical Society has elected Dr. D. S. Reese, Carrollton, President; Dr. E. G. Kirby, Bowden, Vice-President; Dr. H. J. Goodwyn, Carrollton, Secretary-Treasurer.

Chattooga County Medical Society has elected Dr. G. F. Martin, Menlo, President; Dr. R. E. Talley, Trion, Vice-President; Dr. H. D. Brown, Summerville, Secretary-Treasurer.

Coffee County Medical Society has elected Dr. S. L. Vinson, Douglas, President; Dr. A. S. M. Coleman, Douglas, Vice-President; Dr. T. H. Clark, Douglas, Secretary-Treasurer.

DeKalb County Medical Society has elected Dr. J. R. Evans, Decatur, President; Dr. C. L. Allgood, Scottdale, Vice-President; Dr. B. V. Wilson, Decatur, Secretary-Treasurer.

Hart County Medical Society has elected Dr. G. T. Harper, Dewyrose, President; Dr. A. O. Meredith, Hartwell, Vice-President; Dr. W. E. McCurry, Hartwell, Secretary-Treasurer.

Jenkins County Medical Society has elected Dr. M. E. Perkins, Millen, President; Dr. Q. A. Mulkey, Millen, Vice-President; Dr. C. Thompson, Millen, Secretary-Treasurer.

Jones County Medical Society has elected Dr. W. J. Waits, Gray, President; Dr. J. D. Zachary, Gray, Secretary-Treasurer.

Laurens County Medical Society has elected Dr. J. E. New, Dexter, President; Dr. D. L. Murray, Dexter, Vice-President; Dr. O. H. Cheek, Dublin, Secretary-Treasurer.

Macon County Medical Society has elected Dr. C. A. Greer, Oglethorpe, President; Dr. G. W. Nelson, Marshallville, Vice-President; Dr. C. P. Savage, Montezuma, Secretary-Treasurer.

Montgomery County Medical Society has elected Dr. H. C. Sharpe, Uvalda, President; Dr. J. H. Dees, Alston, Vice-President; Dr. J. E. Hunt, Mt. Vernon, Secretary-Treasurer.

Stephens County Medical Society has elected Dr. E. F. Chaffin, Toccoa, President; Dr. W. H. Swain, Martin, Vice-President; Dr. C. L. Ayers, Toccoa, Secretary-Treasurer.

Toombs County Medical Society has elected Dr. I. E. Aaron, Lyons, President; Dr. W. W. Odom, Lyons, Secretary-Treasurer.

Upson County Medical Society has elected Dr. C. A. Harris, The Rock, President; Dr. E. W. Carter, Thomaston, Vice-President; Dr. R. L. Carter, Thomaston, Secretary-Treasurer.

Wilkes County Medical Society has elected Dr. O. S.

(Continued on page 36)

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(Continued from page 34)

Wood, Washington, President; Dr. E. W. Ragsdale, Tignall, Vice-President; Dr. H. T. Harriss, Washington, Secretary-Treasurer.

Ninth District Medical Society has elected Dr. Grady N. Coker, President; Dr. C. L. Ayers, Vice-President; Dr. Jesse C. Bennett, Jefferson, Secretary.

The Interstate Post Graduate Medical Association of North America will meet in Atlanta, October 15-19, 1928.

A two-day institute was held at Athens, March 7-8, under the auspices of the Clarke County Medical Society and the Athens-Clarke County Child Health Demonstrations.

At the annual meeting of the Fulton County Medical Society, Atlanta, the Luther C. Fischer prizes of $100 each for 1927 were awarded. Dr. Madison Hines Roberts received that for the best original research work and Doctors Richard H. Wood and George A. Williams the prize for the best essay. Dr. Fischer, desiring to stimulate study and research among the younger members of the Society, has offered prizes for 1928. Prizes were first awarded in 1926.

The Davis-Fischer Sanatorium, Atlanta, announced that Dr. W. M. Dunn, President of the Staff, has offered a $50 award for meritorious work done by any member of the staff this year.

Dr. Wm. R. Dancy, Savannah, Chairman of the Committee on Awards for the Crawford W. Long Prize, has announced that Dr. M. Hines Roberts, Atlanta, won the prize for 1927 by writing the best paper on original research work under the title "Pigments in the New-Born Infants". The paper was read before the annual meeting of the State Association last May in Athens.

The American Association for Medical Progress, New York, announces that it has located another survivor of the yellow fever experiments conducted in Cuba by the Walter Reed Commission in 1901. James Hildebrand, aged 73, now living in Atlanta, then a private in the hospital corps. Records indicate that he volunteered to be bitten by infected mosquitoes, but was declined on account of his age, but he risked his life to prove or disprove the theory of the transmission by fomites, by sleeping in beds vacated by men who had just died, wore the clothes of yellow fever victims and submitted to every possible contact with contaminated objects in an effort to be infected, thus it was proven that yellow fever is not transmitted by fomites, which knowledge is considered very important. A bill has been introduced into Congress to provide further for the surviving members of these experiments and their dependents.

Dr. W. C. Humphries, Griffin, Commissioner of Health for Spalding County, sponsored a tuberculosis clinic which was conducted by Dr. E. W. Glidden of Alto on March 16 at Griffin.

Dr. J. W. Palmer, Ailey, was recently appointed Assistant Chief Surgeon of the Seaboard Air Line Railway.

Dr. Leo D. Parry has resigned from the Roentgen-Ray Department of the John D. Archbold Memorial Hospital, Thomasville, and will engage in practice in Lancaster, Pennsylvania.

Miss Caroline Sutton, Superintendent of the Davis-Fischer Sanatorium for many years, has resigned on account of illness in her family. Miss Frances L. Williams is the new Superintendent. Miss Alice R. Thompson, who has been one of the assistants to the Superintendent for several years, has been made Superintendent of Nurses and Assistant to the Superintendent. Miss Mary Bethel is Dietitian. Dr. W. F. Lake has charge of the X-ray and Laboratory Department.

Dr. J. A. McGarity of Atlanta, has been elected President of the Atlanta Neurological Society.

Dr. Guy G. Lunsford, Weston, has been appointed Health Officer for Crisp County.

Deaths

Dr. Stephen H. Hankinson, Augusta, aged 51, died February 11.

Dr. James T. A. Gaines, Dewyrose, aged 59, died February 28.

Dr. William Perrin Nicholson, Atlanta, aged 70, died April 4 after an illness of six years.

Dr. William Jacob Little, Macon, aged 56, died February 26 at a local hospital of caustic poison.

(Continued on page 38)

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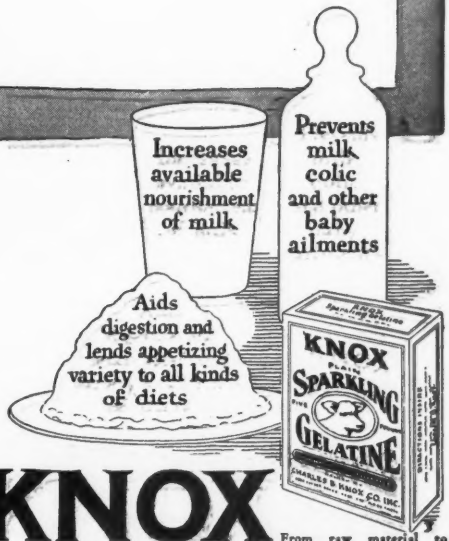
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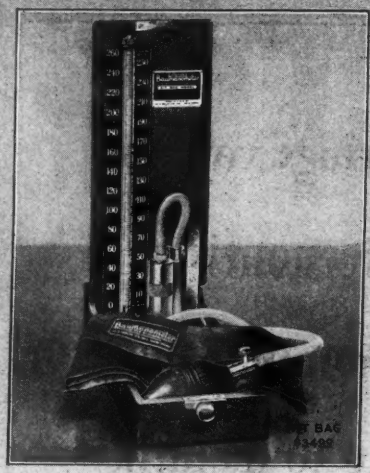


1916—1928

YEAR after year, more Baumanometers go into service than all other mercury types combined;

—for although it is not in any sense a cheap instrument, experience shows that it actually costs less in the long run.

The Baumanometer is, moreover, the only instrument in all of the world whose glass tube is *guaranteed* against breakage.

And for *accurate bloodpressure readings* — ten times ten thousand users will tell you it is unfailingly reliable.

YOUR DEALER HAS IT

Lifetime Baumanometer
STANDARD FOR BLOODPRESSURE

W. A. Baum Co. Inc. Originators
and Makers Since 1896 of Bloodpressure Apparatus Exclusively
100 Fifth Avenue New York

(Continued from page 36)

Dr. David M. Houk, Atlanta, aged 84, died March 1 of bronchopneumonia and influenza.

Dr. James S. Vaughan, Powder Springs, aged 65, died February 22 of pneumonia.

Dr. Robert Emmett Corley, Augusta, aged 54, died February 9 at Atlanta.

Dr. James Dean DeLamar, Columbus, aged 47, died suddenly February 23 of heart disease.

Dr. Henry Halsey Battey, Rome, aged 70, died suddenly March 11 of cerebral hemorrhage.

KENTUCKY

Dr. Phillip F. Barbour, Louisville, has been appointed by the State Board of Health to supervise plans for a graduate course of instruction in Louisville, probably the first two weeks in July, to be available to physicians throughout the State. Opportunities will be afforded to review physical diagnosis, to learn new laboratory methods in blood and sputum work, the routine of periodic health examinations, to attend clinics, and make ward rounds in the hospitals.

Dr. Stuart Graves, Professor of Pathology and Dean, University of Louisville School of Medicine, has been appointed Dean of the School of Medicine of the University of Alabama, Tuscaloosa, Alabama.

Dr. James O. Carson, Bowling Green, celebrated the completion of his fiftieth year of medical practice in that City, January 31, to which were invited the members of the staff of the City Hospital and other physicians throughout the city.

Dr. Joseph P. Holt, Versailles, and Miss Nettie Harris, were married February 18.

Deaths

Dr. Henry A. Cottell, Louisville, aged 80, died March 6 of bronchitis.

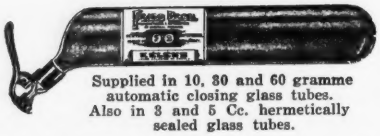
Dr. Wayne Pryse, Beattyville, aged 45, died February 12.

Dr. John Mason Kash, Lexington, aged 46, was found dead February 21 of a gunshot wound.

(Continued on page 40)

KELENE Pure Ethyl Chloride

For Local and General
ANESTHESIA



Supplied in 10, 30 and 60 gramme automatic closing glass tubes. Also in 3 and 5 Cc. hermetically sealed glass tubes.

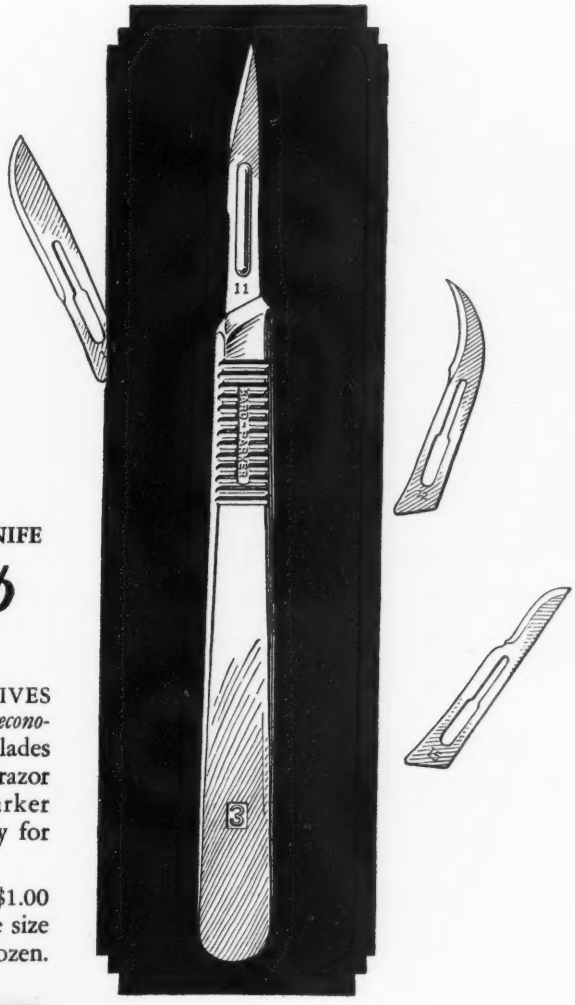
The automatic closing tubes require no valve. Simply press the lever.

Manufacturers

FRIES BROS.
92 Reade St., New York

Sole distributors for the U. S. and Canada

MERCK & CO., Inc.
Main Office: Rahway, N. J.

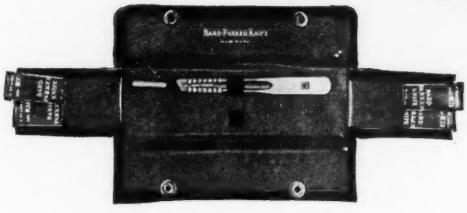


BARD-PARKER KNIFE

It's Sharp

BARD-PARKER KNIVES are *sharp, safe* and *economical.* Because the used blades may be replaced by new razor sharp blades, Bard-Parker Knives are always ready for instant use.

Prices—No. 3 handles, $1.00 each. Blades, six of one size per package $1.50 per dozen.



Set No. 104—One No. 3 handle and six each of Nos. 10, 11, 12 and 15 blades in leather case, $5.75.

BARD-PARKER COMPANY, INC.
150 Lafayette Street. New York. N.Y.

(Continued from page 38)

Dr. William Edward Ray, Allais, aged 56, died February 19 of pneumonia.

Dr. Washington Fletcher Nichols, Munfordville, aged 56, died March 19 of tuberculosis.

Dr. William George Lewis, Berea, aged 58, died February 20 at the College Hospital of heart disease.

Dr. John Lee Farmer, Russellville, aged 58, died February 26 of carcinoma of the prostate.

Dr. Shaler Berry, Newport, aged 58, died March 1.

LOUISIANA

At the recent annual meeting of the Louisiana State Medical Society held in Baton Rouge, the following officers were elected: Dr. F. T. Gouaux., Lockport, President-Elect; Dr. C. A. Weiss, Baton Rouge, Dr. F. C. Bennett, Monroe, and Dr. J. Birney Guthrie, New Orleans, Vice-Presidents; Dr. P. T. Talbot, New Orleans, Secretary-Treasurer.

The Seventh District Medical Society held its spring meeting in Lake Charles, March 21. The following officers were elected: Dr. J. W. Fonk, Crowley, President; Dr. J. D. Hunter, Rayne, Vice-President; Dr. S. R. Henry, Crowley, Secretary-Treasurer.

The Greenwell Springs Sanatorium, a state institution for the treatment of tuberculosis, near Baton Rouge, has been opened. There are accommodations for seventy white patients and about thirty-four negro patients. Various police juries are being invited to provide units at the institution for the care of patients from their respective communities.

Dr. Edmund L. Leckert was recently reelected Chairman of the Staff of Mercy Hospital, New Orleans.

Dr. Abraham L. Metz, City Chemist of New Orleans for thirty-six years, has resigned on account of ill health.

Deaths

Dr. Edouard Michel Dupaquier, New Orleans, aged 69, died March 13.

Dr. Fred James Frater, Shreveport, aged 57, died March 4 of influenza.

Dr. George Rossner, Gretna, aged 56, died recently of bronchopneumonia following influenza.

MARYLAND

The State Department of Health, cooperating with parent-teacher associations and the State Department of Education, is making arrangements for the examinations of children who will enter school this fall for the first time, so that physical defects may be discovered and corrected before school opens.

A new annex to the Emergency Hospital, Annapolis, is being constructed. It will be a four-story building and will add 100 beds.

The cornerstone of the William H. Welch Medical Library at Johns Hopkins University School of Medicine, Baltimore, was laid March 14. Frank J. Goodnow, LL.D., President of the University, placed in the stone a copper box containing correspondence between Dr. Welch, the University and the General Education Board, whose financial help made the library possible.

The campaign for funds for the Eudowood Sanatorium which closed March 28, netted about $340,000, which will enable the sanatorium to pay its debt, make certain improvements in facilities and start off with an endowment of $200,000.

(Continued on page 42)

Simplified Lactic Acid Milk Feeding

In addition to Lactic Acid Milk Merrell-Soule offers:

KLIM
POWDERED WHOLE MILK

—whole milk to which nothing has been added and from which only the water content has been removed. It is uniform as to composition—low in bacterial count—safe and practical for infant feeding.

POWDERED PROTEIN MILK

This is the dehydrated equivalent of Finkelstein's original Eiweissmilch. Sustained pediatric recognition and approval testify to the fact that Merrell-Soule Powdered Protein Milk has a definite place in infant feeding.

(Recognizing the importance of scientific control, all contact with the laity is predicated on the policy that Lactic Acid Milk and its allied products be used in infant feeding only according to a physician's formula.)

REALIZING the desirability, from the pediatrician's viewpoint, of scientific simplification in infant feeding, Merrell-Soule Powdered Whole Lactic Acid Milk is offered with claims that—

—it represents the simplest and quickest method of preparing Lactic Acid Milk feedings.

—it is absolutely uniform. Published analyses are strictly adhered to.

—its precurdled casein forms in fine floccules. Blockage of the nipple holes cannot occur.

—Bacillus Bulgaricus is retained in a viable condition, thus enhancing its therapeutic value.

The need for a fine curd in Milk is answered by Merrell-Soule Powdered Whole Lactic Acid milk; for the fine curd is inherent in the product.

Literature and Samples sent on Request

MERRELL-SOULE CO., INC., 350 Madison Ave., New York, N. Y.

MERRELL-SOULE
Powdered Whole
LACTIC ACID MILK

Merrell-Soule Powdered Milk Products are packed to keep indefinitely and trade packages carry no expiration date.

Amenotone in

AMENORRHEA *and the* MENOPAUSE

Many derangements and disturbances of the menstrual and sexual functions of the female respond satisfactorily to Amenotone. Try it in these cases and watch results.

100
CAPSULES
AMENOTONE
REG. U. S. PAT. OFF.
This product contains Corpus Luteum and Extract of Thyroid combined with iron, arsenic, strychnine and calcium glycerophosphate — tonics and reconstructives of recognized therapeutic value, in proper proportion to give a product of exceptional value.
Dose: One capsule three times daily.
Indications: Amenorrhea, Dysmenorrhea, Chlorosis and Functional Sterility.
JOHN T. MILLIKEN AND CO.
MANUFACTURING PHARMACISTS
SINCE 1894
ST. LOUIS, U. S. A.

FORMULA

Each Capsule of Amenotone Contains:

Desiccated Corpus Luteum, 1 gr.
Desiccated Whole Ovary, 1 gr.
Blaud's Mass., 2 grs.
Calcium Glycerophosphate, 2 grs.
Arsenous Acid, 1-40 gr.
Strychnine Sulphate, 1-120 gr.
Desiccated Thyroid, 1-4 gr.

DOSE: ***One capsule three times daily***

SEND FOR SAMPLE BOTTLE

You may have a few cases now which you can put on Amenotone for a clinical trial.

Let us send you a sample bottle. Also a complete Price List.

ABBOTT The House of QUALITY and SERVICE LABORATORIES

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ABBOTT The House of QUALITY and SERVICE LABORATORIES

HASLAM'S

Surgical Instruments are correct in finish, pattern and quality

Ask your local dealer for our RUSTLESS STEEL

No Plating.
Best for use and length of service.

FRED HASLAM & CO., Inc.

Brooklyn, N. Y.

Established 1848

(Continued from page 40)

Dr. Solomon Katzenellenbogen, formerly Chief Resident Physician at the Hospital Canton, Geneva, Switzerland, and Lecturer in Internal Medicine at the University of Geneva, has taken over his new duties at the Johns Hopkins University School of Medicine, Baltimore, as Associate Professor in Psychiatry. He will also have charge of the Department of Internal Medicine at Phipps Psychiatric Clinic.

The Trustees of Johns Hopkins University announced that the first course of lectures under the William Sydney Thayer and Susan Read Thayer Lectureship in Clinical Medicine was given March 20-21 at the School of Hygiene and Public Health by Sir Humphrey Rolleston, Regius Professor of Physic, University of Cambridge, England. The Lectureship was endowed last year by friends of Dr. Thayer during the session of the American Medical Association in Washington, D. C., when Dr. Thayer was made President-Elect of the Association. The income from the fund is to defray the expenses of annual lectures on subjects in clinical medicine, pediatrics, neurology or borderline branches. A committee of professors at Johns Hopkins will select the lecturers.

Dr. John Collinson, Jr., has been appointed head of the Bureau of Vital Statistics of the State Department of Health on a full-time basis, succeeding Dr. Frederic V. Beitler, resigned.

Deaths

Dr. Jay Tyrrell Hennessy, Baltimore, aged 37, died March 17, of heart disease.

Dr. Frank Bennet Adams, Baltimore, aged 76, died February 17 of carcinoma of the stomach, liver and intestine.

Dr. Thomas Somerset Owen, La Plata, aged 57, died February 23 of cirrhosis of the liver.

Dr. Robert Franklin Hardesty, Baltimore, aged 66, died March 18 of carcinoma of the stomach.

Dr. George F. Taylor, Baltimore, aged 71, died March 25 of carcinoma of the tongue and stomach.

Dr. Milton McKinstry Norris, New Windsor, aged 71, died March 12 of arteriosclerosis.

(Continued on page 44)

McKesson Universal Unit No. 100

The McKesson Intermittent Flow Principle

The purpose of the intermittent flow is to supply the nitrous oxid and oxygen to the patient automatically at any rate which the patient uses the two gases, and at any desired pressure in the inhaler.

The intermittent flow is not only one of the means for automatically **maintaining** any desired **mixture** of the two gases, but it is also a means of **maintaining the pressure** of these gases at the inhaler regardless of the rate or volume of the patient's respiration. It relieves the anesthetist of the annoyance of attempting to regulate the flow of gases by hand.

The intermittent flow principle of McKesson appliances supplies gases during the phase of inspiration but **stops** the flow during expirations and respiratory pause. This results in a large saving by preventing the inevitable waste which would occur with a continuous flow of the gases from old-style machines.

Write for catalog and information.

Toledo Technical Appliance Company

Toledo, Ohio.

A SURE SOURCE OF VITAMINS A and D

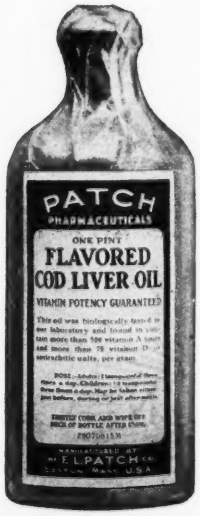
Tested for Your protection.

Clinical evidence has demonstrated the high vitamin potency of Patch's Flavored Cod Liver Oil. It has received nation-wide professional endorsement. But that is not enough! We must test every lot of oil made in our plants to guarantee its vitamin potency.

Children like the pleasant flavor.

VITAMIN A GUARANTEE

The least amount of cod liver oil required daily to promote a renewal of growth in albino rats that have ceased to grow and may show symptoms of malnutrition, such as xerophthalmia, on diets adequate except for vitamin A, is considered as one vitamin A unit. We guarantee more than 500 vitamin A units per gram.



VITAMIN D (ANTIRACHITIC) GUARANTEE

The antirachitic or vitamin D potency of this oil is determined by a modification of the method described by McCollum, Simmonds, Shipley and Park. The least amount of cod liver oil required daily during a period of eight days, to promote recalcification in the tibia of young albino rats suffering from experimental rickets is considered as one vitamin D unit. We guarantee more than 75 vitamin D units per gram. While the quantity and quality of available sunlight may or may not be adequate to meet the needs of growing children, here is a sure source of vitamin potency.

Mail the coupon below for a sample of

Patch's Flavored Cod Liver Oil

The E. L. Patch Co.,
Stoneham 80, Boston, Mass.

Send me a sample of Patch's Flavored Cod Liver Oil.

Name .....

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The "MESCO" Laboratories manufacture the largest line of Ointments in the world. Sixty different kinds. We are originators of the Professional Package. Specify "MESCO" when prescribing Ointments. Send for lists.

Manhattan Eye Salve Company

Louisville, Kentucky

(Continued from page 42)

Dr. Charles Bernard Henkel, Annapolis, aged 57, died February 28 at the Emergency Hospital of acute nephritis.

MISSISSIPPI

Dr. J. R. Johnson is now Resident Physician at the South Mississippi Charity Hospital, Laurel.

George E. Vincent, Ph.D., President of the Rockefeller Foundation, New York, made a tour of inspection of field work in several county health departments in the flooded area and was the guest of the State Health Department, March 1.

Deaths

Dr. William Francis Saul, Montpelier, aged 46, was killed March 26 in an automobile accident.

Dr. William B. Thomason, Morgan City, aged 75, died March 1 of pneumonia.

Dr. James E. Bramlett, Clarksdale, aged 73, died February 25 of injuries received when the automobile in which he was driving was struck by a train.

MISSOURI

The National Tuberculosis Association, cooperating with the Medical Society of Missouri and St. Louis, and Washington University, held a two weeks' regional institute at the Medical School of the University beginning March 26, to train tuberculosis workers.

Bates County Medical Society has elected Dr. A. B. Freeman, Rockville, President; Dr. Carter W. Luter, Adrian, Secretary-Treasurer.

Caldwell County Medical Society has elected Dr. G. S. Dowell, Braymer, President; Dr. Tinsley Brown, Hamilton, Secretary-Treasurer.

Madison County Medical Society has elected Dr. E. E. Higdon, Fredericktown, President; Dr. S. C. Slaughter, Fredericktown, Vice-President; Dr. W. Harry Barron, Fredericktown, Secretary; Dr. M. B. Barber, Fredericktown, Treasurer.

(Continued on page 46)

A-60—"Britesun" Single Arc

"The Nearest Approach to Natural Sunlight"

(Bureau of Standards—Washington, D. C.)

The Bureau of Standards at Washington has made many tests of Ultra Violet producing lamps, and has come forth with the following statement: "Of all the artificial illuminants tested, the Carbon Arc Lamp is the nearest approach to sunlight."—Letter Circular 225, March 5, 1927.

"BRITESUN" SINGLE ARC LAMP gives a balanced spectrum (Ultra Violet rays, Radiant Light rays and Infra Red rays) as in natural sunlight.

Operates on 110 volts, either A.C. or D.C.

Write for Literature

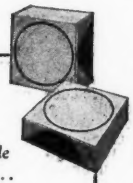
THERAPEUTIC BRITESUN LAMPS INC.

Write for Literature

1115-17 N. Franklin St. Chicago, Ill.

A simple, safe sedative for

NERVOUSNESS
NEURASTHENIA
SLEEPLESSNESS



Each cube contains 17 grains of sodium bromide well disguised . .

Two cubes to a cupful of piping hot water make this pleasant bromide broth doctors and patients alike agree is so effective

SEDOBROL

'Roche'

WHAT IS SEDOBROL 'ROCHE'? From the patient's point of view it is simply a savoury, nutritious bouillon but hidden within is that very valuable therapeutic agent sodium bromide, in a highly refined form—a harmless and most effective sedative for nervous agitation of all types.

Unless you try Sedobrol you cannot appreciate the advantage of this unique form of medication especially in the treatment of unmanageable, apprehensive patients or neurotics with the usual aversion to medicine. They cannot taste the bromide and are not aware that a sedative is being administered unless you care to divulge the secret.

Bromide given in this manner is markedly more effective and there is little chance of nausea or gastric irritation. The 17 grains of sodium bromide which each Sedobrol cube contains provides the salty flavor for the broth in place of table salt. The cube is made of vegetable extractives and condiments—not beef.

Marketed in air-tight metal containers of 10, 30 and 100 cubes
A trial supply will be sent to physicians on request

Dosage

For Simple Insomnia:

2 cubes in a cupful of very hot water, late in the afternoon or, with crackers, in lieu of the evening meal.

For Nervous Affections:

2 to 4 cubes per day. In nervous indigestion 1 cube may be taken directly with the morning and evening meals, or after every meal if preferred.

In Epilepsy:

Ulrich, director of the Swiss Institute for Epilepsy at Zurich, uses 3 to 6 cubes per day. Réprints on the use of Sedobrol in epilepsy in this country as well as in Europe will be sent on request.

Try it for

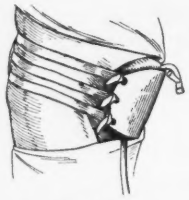
NERVOUS INDIGESTION
NERVOUS HEADACHE
HYSTERIA
MIGRAINE
SICKNESS OF PREGNANCY
DYSMENORRHEA
MENOPAUSE
SEA-SICKNESS
ALCOHOLISM
MORBID EXCITABILITY
SEXUAL HYPERSTHENIA
INSOMNIA

The Hoffmann-La Roche Chemical Works, New York
Makers of Medicines of Rare Quality
19 CLIFF STREET

The Kinney Pneumatic

SUPRAPUBIC DRAINAGE CUP

No longer an experiment. The bulk of our orders are now *Repeat Orders.*



Clean *Comfortable* *Economical*

Held in position by an adjustable elastic belt—Keeps both patient and bed dry and clean.

Price $12.50

C. R. BARD, *Inc.*

(*Exclusive Agents*)

79 Madison Ave. New York City

(Continued from page 44)

The sixth annual "Presidents' Night" was given by the Jackson County Medical Society, Kansas City, April 3. There are twenty-one living past presidents of the Jackson County Medical Society.

The Medical Society of the St. Louis City Hospital was recently reorganized at a meeting of the alumni of the Hospital. Any ex-intern of the St. Louis City Hospital will be reinstated in good standing on payment of this year's dues. A social meeting is being planned for some time in June and a roster of living members from 1875 to 1928 is being arranged. All members in outlying states are requested to communicate with the Secretary of the Society, Dr. Jesse J. Burdick, 2106 East Grand Boulevard, St. Louis. Dr. William T. Coughlin, St. Louis, is President.

The Trudeau Club has presented to the St. Louis Medical Society a resolution dealing with the tuberculosis problem of St. Louis. There is an insufficient number of hospital beds to handle the active cases of tuberculosis. The Trudeau Society recommended bond issues amounting to $2,450,000 for the erection and equipment of buildings at City Hospitals 1 and 2, and at the Koch Hospital. There are now about 620 beds in St. Louis for such patients and a few available at Mount Vernon for early cases. There is a need for beds for colored patients.

Washington University, which has grown from a small seminary to a great institution with more than three thousand students, a valuation including endowments of nearly $15,000,000, and an international reputation in many fields of research and education, celebrated its Diamond Jubilee on February 22.

Sedalia, by a three-to-one vote in special election March 6, took advantage of an offer of Mr. J. H. Bothwell which will enable it to erect a $200,000 City Hospital at an actual cost to tax payers of only $100,000. The City voted a $200,000 bond issue and Mr. Bothwell set aside a trust fund to retire half the issue at his death and also to provide $50,000 for maintenance of the institution.

The Southeast Missouri Hospital, Cape Girardeau, was recently dedicated. The building cost $150,000.

(Continued on page 48)

Prescribe DRYCO
The Irradiated Milk

NOT ONLY for well babies, but particularly for those unable to digest other forms of milk, Dryco has proven of inestimable value. Physicians all over the world know from years of experience that this milk can be depended upon for good results.

In addition to its many other advantages, Dryco is highly antirachitic, due to irradiation by the ultra violet ray.

SEND FOR SAMPLES, SUGGESTED FEEDING TABLES AND CLINICAL DATA

For convenience, pin this to your Rx blank or letterhead and mail.

THE DRY MILK COMPANY **18 Park Row, New York, N. Y.**

AMERICAN

HAYFEVER

All Sections—NORTH—EAST—SOUTH—WEST—*All Seasons*

Adequately and accurately covered by

ARLCO-POLLEN EXTRACTS

for Diagnosis and Treatment

AN ARLCO-POLLEN COLLECTOR

TREE HAYFEVER can be accurately identified by skin test with the pollens of locally prevalent trees and thereby differentiated from the "common colds" of early spring.

GRASS HAYFEVER begins about the time *tree hayfever* ends, *viz.* May 15th, and need not be confused with the earlier appearing and sometimes overlapping tree hayfever.

WEED HAYFEVER—August to frost—is unrelated to the previously occurring *grass hayfever* and is occasioned, according to the locality, by such late pollinating plants as the Ragweeds—Russian Thistle—Western Water Hemp—Carelessweed—or Sage Brush.

LIST of pollens for any section—any season—with commentary circular discussing the treatment of hayfever by *preseasonal* or *coseasonal* method, with respective schedules of dosage—sent on request.

THE ARLINGTON CHEMICAL COMPANY

Yonkers, N. Y.

BACILLUS ACIDOPHILUS CULTURE
(B. A. CULTURE)

With the coming of warmer weather, an increased incidence of infantile intestinal infections is usually noted.

In past seasons our Cultures have been used with success by physicians throughout the South. They are at your service at our conveniently located depository stores.

B. B. CULTURE LABORATORY, INC.

Yonkers, New York

(Continued from page 46

The Liberty Hospital, St. Louis, which for four years was a private osteopathic institution, has been sold under a receivership for $252,000 and will be used in future as an old peoples' home conducted by the Good Samaritan Althenheim, supported by the Evangelical Churches of the district.

Dr. Jesse E. Douglass, Ah-gwah-ching, Minnesota, has been appointed Superintendent of the Jasper County Tuberculosis Hospital, Webb City, succeeding Dr. Varney Hazlewood, resigned.

The Saline County Medical Society gave a banquet March 7 in honor of Dr. Francis A. Howard, Slater, who has completed fifty years in the practice of medicine.

Dr. Andrew C. Henske was recently elected President of the Trudeau Club of St. Louis.

Dr. Otto H. Schwarz returned from abroad to become Obstretrician in Chief at the new Maternity Hospital and to head the Department of Obstetrics at Washington University School of Medicine, St. Louis.

Dr. Louis Rassieur and Mrs. Lillie W. Wehmiller, both of St. Louis, were married March 19.

Deaths

Dr. Michael Wiley, Aldrich, aged 82, died March 10 in a hospital at Springfield of carcinoma of the stomach.

Dr. Henry W. Bewig, St. Louis, aged 64, died March 5.

Dr. Eugene W. Lewis, St. Louis, aged 50, died February 18 at St. Johns' Hospital of cerebral hemorrhage and chronic nephritis.

Dr. John C. Story, St. Joseph, aged 64, died February 11 of gangrene of the lung and influenza.

Dr. Phillip Patrick Burton, New Hartford, aged 60, died March 10 of pneumonia following influenza.

Dr. Charles G. Bang, St. Louis, aged 63, died March 2 as the result of cerebral hemorrhage suffered some time ago.

Dr. Omer Willfer Clabaugh, Sedalia, aged 59, died February 13 of coronary embolism.

(Continued on page 50)

Where There is Deficiency

In the alkali reserve of the body with its attendant headaches, lassitude and debility, a rational system of alkalinization is available in

Kalak Water

The alkali depletion associated with pneumonia and influenza suggests the use of Kalak Water because in this way it becomes possible to supply those elements needed for maintaining a normal alkali reserve.

Where the patient shows a tendency towards acidosis, Kalak Water may be conveniently substituted for the regular drinking water. Kalak Water contains bicarbonate of sodium, potassium, calcium and magnesium. It is the strongest alkaline water of commerce.

KALAK WATER CO., 6 Church St., New York City

RESTORING
NERVE TONE
THE pronounced sedative effect necessary in the treatment of chorea, epilepsy, migraine and the various neuroses is promptly secured by the administration of
LUMINAL
TRADEMARK REG. U. S. PAT. OFF. AND CANADA
Brand of Phenobarbital
Luminal is supplied in tablets of 1½, ½ and ¼ grain.
Elixir of Luminal, containing ¼ grain to the teaspoonful, is the most agreeable form for administering small doses.
Write for descriptive literature
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ELIXIR OF LUMINAL
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PHYSICIANS' OFFICE FURNITURE

Mahogany
Walnut
Quartered Oak

Style G-123

Style 1000

Tables, Chairs
Stands, Cabinets
Stools, Accessories

Catalog sent on request

Sold by Dealers

W. D. ALLISON CO., Mfrs.

931 No. Ala. St. **Indianapolis**

(Continued from page 48)

Dr. John C. Falk, St. Louis, aged 64, died March 3 of lobar pneumonia.

Dr. Carolina Post Guyer, Kansas City, aged 73, died February 19 of myelogenous leukemia.

Dr. James J. Hodges, Granby, aged 66, died January 26 of injuries received in a fall.

Dr. Robert W. Rea, Plattsburg, aged 67, died January 23 at the Missouri Methodist Hospital, St. Joseph, of pneumonia.

NORTH CAROLINA

Randolph County Medical Society has elected Dr. W. L. Lambert, Asheboro, President; Dr. C. C. Hubbard, Farmer, Vice-President; Dr. Tiffany Barnes, Asheboro, Secretary-Treasurer.

Thirty-four Asheville physicians will be associated with the Asheville Phychiatric Institute, a new hospital which will occupy the buildings of the old Hill Crest Manor and which will be opened soon.

The Medical Arts Club, Greensboro, was recently organized. Dr. C. R. Reaves was elected President; Dr. J. W. Tankersley, Vice-President; Dr. R. B. Davis, Secretary-Treasurer.

The Carolina General Hospital, the Moore-Herring Hospitals, and the organization of the Wilson Clinic, have consolidated into what will be known as The Memorial Hospital and will occupy the Carolina General Hospital Building, Wilson.

Dr. Frank R. Sharpe has been elected President of the St. Leo's Hospital Staff, Greensboro; Dr. Allen C. Banner, Secretary-Treasurer. The retiring officers are Dr. C. E. Moore and Dr. Russell O. Lyday.

Deaths

Dr. Zenas Fearing, Elizabeth City, aged 54, died March 17.

Dr. Emile Bonniwell Quillen, Rocky Mount, aged 46, died March 7 at a local hospital, of pneumonia.

Dr. Garland A. Gerran, High Point, aged 59, died January 10.

(Continued on page 52)

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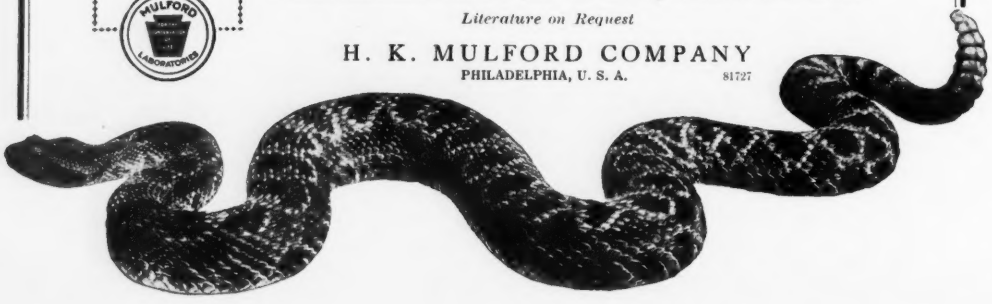

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NEW ORLEANS, LA.

(Continued from page 50)

OKLAHOMA

Pottawatomie County Medical Society has elected Dr. H. G. Campbell, Seminole, President; Dr. Eugene Rice, Shawnee, Dr. R. C. Kaylor and Dr. T. C. Sanders, Shawnee, Vice-Presidents; Dr. W. M. Gallaher Shawnee, Secretary-Treasurer.

Dr. E. E. Connor, who recently moved to Erick, has bought a half interest in the New Erick Hospital. He is associated with Dr. G. H. Stagner who is Chief Surgeon and Founder of the Hospital.

Dr. Morris Lhevine, Tulsa, has been appointed Counselor of Oklahoma for the Radiological Society of North America.

Dr. Eugene Rice and Miss Mary Louise Alexander, both of Shawnee, were married February 11.

Deaths

Dr. Walter Preston Couch, Rose, aged 56, died January 13 of carcinoma of the intestine.

Dr. Thomas Henderson, Fort Towson, aged 56, died February 25 at Paris, Texas, of heart disease.

Dr. James R. Callaway, Pauls Valley, aged 73, died March 10.

Dr. R. H. Grassham, Bryan, aged 60, died April 28.

Dr. S. Augustus Rice, Velma, aged 72, died February 23.

Dr. A. T. Dobson, Hobart, aged 60, died March 27 of heart disease.

Dr. J. M. Bolger, Poteau, aged 42, died February 23 following a brief illness.

TENNESSEE

At the recent annual meeting of the Tennessee Medical Association, Nashville, Dr. Kirby S. Howlett, Franklin, was elected President; Dr. James R. Bone, Lebanon, Dr. James T. Leeper, Lenoir City, and Dr. James W. McClaran, Jackson, Vice-Presidents; Dr.

(Continued on page 54)

For Coughs and Colds Between Seasons
Calcreose Tablets and
Compound Syrup of Calcreose

In the more serious respiratory conditions where an efficient expectorant is required Calcreose Tablets will be useful.

For coughs requiring the expectorant action of creosote, Compound Syrup of Calcreose will fill your requirements satisfactorily. It has a pleasant taste and is well tolerated.

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(Continued from page 52)

Harrison H. Shoulders, Nashville, Secretary (reelected). The next meeting will be at Jackson.

Sullivan, Wilson and Smith Counties have provided for full-time county health units as of April 1. Greene County has made its appropriation, effective July 1, when new health units for Monroe and Campbell Counties will be established.

About twenty residents of Memphis who had yellow fever in the epidemic of 1897 have volunteered to give specimens of blood to be forwarded to the International Health Board workers of the Rockefeller Foundation in British Nigeria, Africa, to be tried out as a treatment for yellow fever now present in that region. Dr. William Krauss, Professor of Tropical Medicine at the University of Tennessee College of Medicine, Memphis, made the request for volunteers. Many persons who had yellow fever in Memphis in the epidemic of 1878-1879 volunteered, but they were not considered eligible.

The home of Dr. Henry L. Douglass, Bridgeton Road, Nashville, was destroyed by a fire of unknown origin, February 18.

Dr. Leonard W. Edwards has been elected President of the Board of St. Thomas' Hospital, Nashville.

Deaths

Dr. John Valentine Handwerker, Memphis, aged 84, died March 13 of uremia and chronic nephritis.

Dr. James R. Crutcher, Henning, aged 70, died February 27 while visiting his son in Honolulu, Hawaii.

Dr. George Manning Ellis, Chattanooga, aged 63, died March 5 at Memphis of nephritis and uremia.

TEXAS

Lubbock-Crosby County Medical Society has elected Dr. J. P. Lattimore, Lubbock, President; Dr. A. T. Stewart, Lubbock, Vice-President; Dr. F. B. Malone, Lubbuck, Secretary.

The new Mineral Wells Sanitarium, erected and equipped at a cost of approximately $300,000, was opened recently. The Mineral Wells Clinic, to be operated in connection with the sanitarium will be housed in the Pavilion of the Crazy Water Hotel. Dr. George Caldwell, formerly of Baylor University, School of Medicine, is at the head of the Clinic and Staff.

The Navarro Clinic, Corsicana, held its official opening March 14. The building was completed at a cost of approximately $120,000. It is three stories and has a thirty bed capacity.

Dr. Thomas W. Grice, Fort Worth, was recently appointed an associate medical director of the American National Insurance Company, Galveston.

Dr. J. M. Doss, McAllen, Superintendent of the McAllen Municipal Hospital, has been appointed Superintendent of the Medical Arts Hospital, Edinburg.

(Continued on page 56)

CLASSIFIED ADVERTISEMENTS

TWO INTERNS WANTED for Morrell Memorial Hospital (Municipal) Lakeland, Florida. Service to begin July 1 for one year rotating service allowance of fifty dollars per month and full maintenance in splendid quarters, must be graduate of class A Medical College. Hospital equipped to equal any in the South in new building less than two years. Address Dr. Eugene B. Elder, Superintendent and Business Manager.

M. D. UNIVERSITY OF VIRGINIA, age 25, two-year surgical internship in 300 bed hospital, some operating experience, desires assistantship to man doing general practice and surgery, preferably connected with hospital having some charity beds. Available July 1. Address P. O. Box 293, University, Va.

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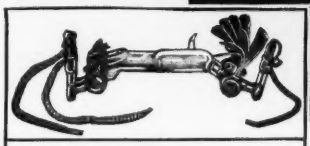

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The above quotation has been taken from an article which appeared in the Journal of the American Medical Association, October 8, 1927, Vol. 89, pp. 1222-1225, and might be of considerable importance as a determining factor in the source of artificial ultra-violet light to be employed.

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(Continued from page 54)

Dr. Henry C. Hartman has resigned as Dean of the University of Texas School of Medicine, Galveston, and as Professor of Pathology.

Deaths

Dr. Harvey Spears Kinard, El Paso, aged 50, died January 20 of angina pectoris.

Dr. Andrew Jackson Parke, Dallas, aged 54, died February 21, of pellagra.

Dr. George Washington Whiteside, Sanatorium, aged 43, died February 20 of injuries received in an automobile accident.

Dr. W. F. Odom, Kurten, aged 58, died suddenly February 17 of angina pectoris.

Dr. J. R. Reeves, Blanco, aged 69, died February 29.

Dr. William Calhoun Mullins, Fort Worth, aged 59, died March 15 of injuries received when struck by an automobile.

Dr. William R. Hoard, Sherman, aged 58, died suddenly in February of coronary occlusion.

Dr. Richard M. Greer, Whitney, died in January.

Dr. Charles Dashiel Roberts, Cedar Hill, aged 64, died February 2 in a hospital at Dallas.

Dr. Otis Charles Michie, Dallas, aged 39, died March 8 of pneumonia.

Dr. C. V. Ezell, Cleburne, aged 37, died in a hospital at Temple, December 16 of pneumonia which developed after an extended illness of several weeks.

VIRGINIA

Alexandria Medical Society has elected Dr. Llewellyn Powell, President; Dr. W. Clyde West, Vice-President; Dr. Peter B. Pulman, Secretary-Treasurer. All are of Alexandria.

Halifax County Medical Society has elected Dr. J. D. Hagood, Clover, President; Dr. J. B. Lacy, Nathalie, Vice-President; Dr. J. A. Owen, Turberville, Secretary-Treasurer (reelected).

The Southwestern Virginia Medical Society held its

(Continued on page 58)

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(Continued from page 56)

semi-annual meeting in Marion March 29-30. Dr. J. L. Early, Radford, is president; Dr. D. M. Sanders, Chilhowie, Vice-President; Dr. E. G. Gill, Roanoke, Secretary-Treasurer.

A called meeting of all the physicians in Hopewell was held on the evening of February 17, at which time they organized into a "Hospital Staff". The following officers were elected: Dr. J. C. Bodow, Chairman; Dr. W. W. Cleere, Vice-Chairman; Dr. T. E. Armstrong, Secretary; Dr. S. E. Gunn, Treasurer.

Mt. Regis Sanatorium, Salem, is building an addition which will give an increased space in the Culinary Department and will also increase the Nurses' quarters. Several rooms are being added to the Page Cottage, the private sanatorium of Doctors Everett E. Watson and Churchill Robertson.

One of the most modern theatres in the South was opened in Roanoke March 26. On this occasion, Mr. E. D. Heins, President of the National Theatre Corporation, gave the civic clubs of the city control of the sale of tickets, the receipts from the sale being held in trust by a Board of Trustees of the clubs to be used for the hospitalization of crippled children, or a fund for the erection of a crippled children's hospital in Roanoke for the Southwestern section of Virginia. Over $16,000 was realized on the opening night.

Books owned by Dr. John Peter Mettauer, one of the most distinguished surgeons of his time, have been presented to the Medical College of Virginia Library by Dr. J. D. Eggleston, President of Hampden-Sidney College. Dr. Mattauer, in addition to being a surgeon, devised and made his own instruments. He was the son of a young French surgeon who was with Lafayette during the Revolutionary War.

Mr. Aubrey H. Straus, Director of Laboratories of the State Department of Health, has resigned.

(Continued on page 60)

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Inhibits gonococcal development and minimizes its virulence.

Aids in reducing the purulent secretion.

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(Continued from page 58)

Dr. Rudolph Teusler, of St. Luke's Hospital, Tokyo, Japan, is spending several months with his family in Richmond. A new hospital building is now under construction to replace the old building which was destroyed by earthquake and fire several years ago. Under the direction of Dr. Teusler, this hospital has grown from a small institution in 1899 to one of the medical centers of the Far East.

Dr. J. Fulmer Bright has been reelected Mayor of Richmond.

Dr. William Homer Smith, Professor of Physiology in the Medical School of the University of Virginia, has received a fellowship from the John Simon Guggenheim Memorial Foundation which will enable him to spend next summer abroad in research.

Dr. Raymon D. Garcin and Dr. Clifton M. Miller, Richmond, have been reelected members of the Richmond City School Board.

Deaths

Dr. William D. Meeks, Massies Mill, aged 67, died March 25 of heart disease.

Dr. Joseph Henry Parker, Dendron, aged 53, died March 29 following a short illness.

Dr. John S. Blair, Churchville, aged 80, died March 31.

Dr. Thomas C. Miller, New Hope, aged 55, died in March.

Dr. James D. Estes, Cascade, aged 91, died January 30.

Dr. Arthur Lewis Martin, Naulakla, aged 60, died March 10 of pneumonia following erysipelas.

Dr. William D. Meeks, Smug Dale, Nelson County, aged 67, died March 26 of heart trouble.

WEST VIRGINIA

Deaths

Dr. John A. Burke, Crawford, aged 61, died suddenly while attending a patient at Duffy, March 20.

Dr. Charles Milton Brown, Mt. Hope, aged 58, died March 8 following a long illness.

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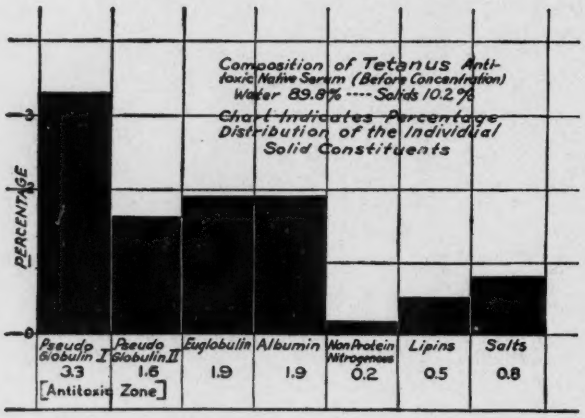

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